PNE-3012(Vol. 2)

1968

STATISTICAL ANNEX OF THE ECONOMETRIC STUDY OF SMALL AND INTERMEDIATE SIZE DIAMETER DRILLING COST FOR THE UNITED STATES

Prepared for
U. S. Atomic Energy Commission
Washington, D. C.

MATHEMATICA
One Palmer Square
Princeton, New Jersey

Printed in USA. Price $3.00. Available from the Clearinghouse for Federal Scientific and Technical Information, National Bureau of Standards, U. S. Department of Commerce, Springfield, Virginia 22151.

USAEC Division of Technical Information Extension, Oak Ridge, Tennessee

PNE-3012(Vol. 2)

NUCLEAR EXPLOSIONS-PEACEFUL
APPLICATIONS (TID-4500)

STATISTICAL ANNEX OF THE ECONOMETRIC STUDY OF SMALL AND INTERMEDIATE SIZE DIAMETER DRILLING COST FOR THE UNITED STATES

Prepared for

U. S. Atomic Energy Commission
Washington, D. C. 20585

under

Contract Number AT(04-3)-744

MATHEMATICA
Princeton, New Jersey

CONTENT

II. 8. Total and Average Costs for Uncased Wells: Tables 20 to 24 and the corresponding figures for average costs both as a function of depth and diameter.

II. 9. Difference of Total Drilling Costs Between Cased and Uncased Wells: Tables 25 to 29.

II. 10. Marginal Drilling Costs for Cased Wells: Tables 30 to 34.

II. 11. Marginal Drilling Costs for Uncased Wells: Tables 35 to 39.

II. 12. Estimated Drilling Time Function for Gomez Field (Texas): Tables 40 to 42.

II. 13. Estimated Drilling Time Function for Aggregated Lockridge and South Pyote (Texas): Tables 43 to 44.

*Tables 6.a, 11-13.a, 28.a, 29.a, and 44.a, were excluded since in these cases the coefficient of the independent variable (depth) is equal to the marginal costs.

SECTION I: ESTIMATED DRILLING COST FUNCTIONS FOR SMALL SIZE DIAMETER HOLES

ESTIMATED DRILLING COST FUNCTIONS PER STATE

Includes Average Drilling Estimated Cost Functions (Tables 1 to 54 and their Correspond Figures) and Total Marginal Costs (Tables 1.a to 54.a).

Table 1

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN ALABAMA

$$\hat{Y} = 9 - 0.16(10^{-2})X_1 + 0.19(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	789.	622521.	8.0500	7.8255	0.2245
2	1756.	3083536.	6.5500	6.7082	-0.1582
3	2841.	8071281.	5.7700	5.8859	-0.1159
4	6012.	36144144.	5.9000	6.0969	-0.1969
5	8512.	72454144.	9.4500	9.0097	0.4403
6	11012.	121264144.	14.1500	14.3438	-0.1938

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.90054826E 01	0.37140264E-00	0.24247222E 02	0.09999999E 01	0.
-0.16484000E-02	0.17231981E-03	-0.95659336E 01	0.51536666E 04	0.75709767E 00
0.19371361E-06	0.14509948E-07	0.13350400E 02	0.40273295E 08	0.88172356E 00

```
     RSQ =     0.9929
       R =     0.9965
F( 2,  3)=   210.8145
   SUMUSQ =    0.3591
DURBIN-W.=     2.6819
```

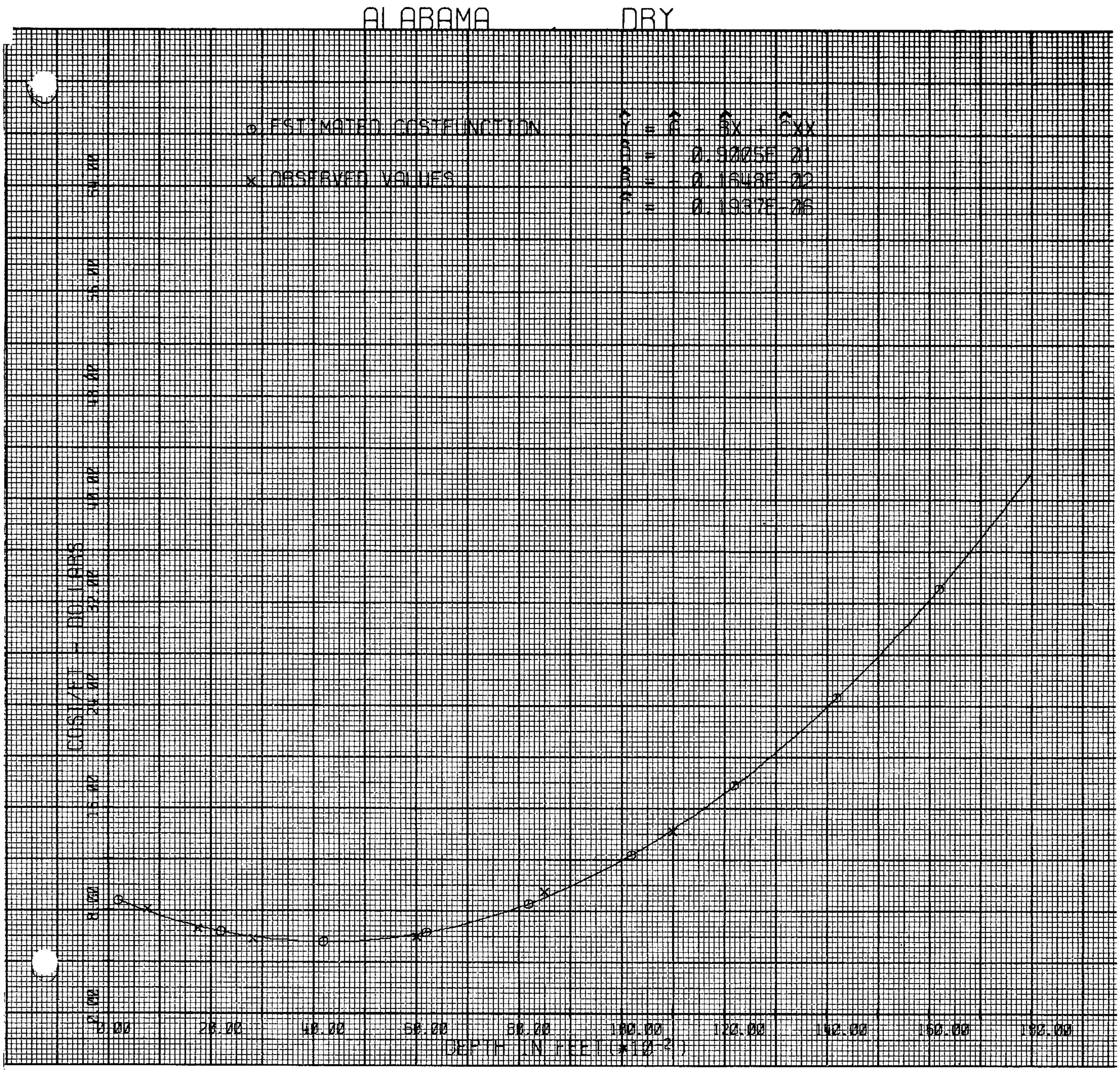

ALABAMA DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.9005E 01
B̂ = - 0.1648E-02
Ĉ = 0.1937E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10^-2)

Table 1a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN ALABAMA

(in dollars)

```
 DEPTH
  13000. feet
TOTAL COST
         7550.69990
        12967.60000
        17412.90000
        22048.80000
        28037.50000
        36541.20100
        48722.10000
        65742.40200
        88764.30100
       118950.00000
       157461.70000
       205461.60000
       264111.90000
       334574.80000
       418012.50000
       515587.21000
       628461.11000
       757796.41000
MINIMUM AVERAGE COST DEPTH
                4254. feet
MINIMUM MARGINAL COST DEPTH
                2836. feet
MARGINAL COST
              6.29010
              4.73740
              4.34690
              5.11860
              7.05250
             10.14860
             14.40690
             19.82740
             26.41010
             34.15500
             43.06210
             53.13140
             64.36290
             76.75660
             90.31250
            105.03060
            120.91090
            137.95340
POINT OF INFLECTION
         23395.74300
MINIMUM AVERAGE COST
              5.49970
MINIMUM MARGINAL COST
              4.33127
```

Table 2

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN ARKANSAS

$\hat{Y} = 9.46 - 0.19(10^{-2})X_1 + 0.27(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	1137.	1292769.	8.2300	7.6410	0.5890
2	2373.	5631129.	5.7000	6.4569	-0.7569
3	3530.	12460900.	5.6600	6.0948	-0.4348
4	4777.	22819729.	6.9900	6.5126	0.4774
5	6799.	46226401.	9.2600	8.9717	0.2883
6	9689.	93876721.	16.1500	16.3130	-0.1630

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.94574813E 01	0.97804947E 00	0.96697371E 01	0.09999999E 01	0.
-0.19041104E-02	0.43140002E-03	-0.44137929E 01	0.47175000E 04	0.82178795E 00
0.26954950E-06	0.38514859E-07	0.69985846E 01	0.30384608E 08	0.92713635E 00

```
      RSQ =    0.9813
        R =    0.9906
F( 2,  3)=   78.5521
    SUMUSQ =   1.4465
DURBIN-W.=    2.0649
```

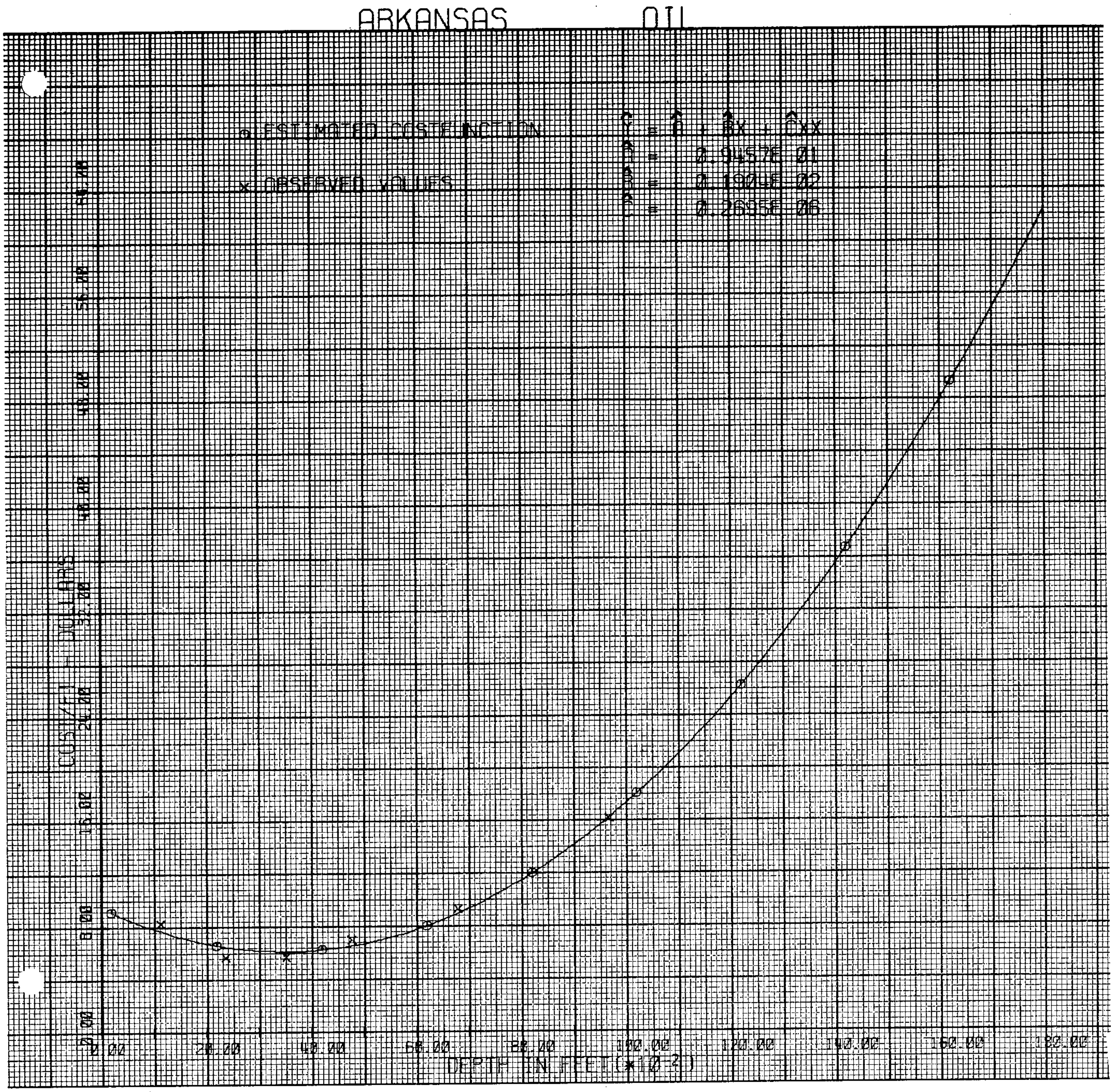

ARKANSAS OIL
⊙ ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.9457E Ø1
B̂ = Ø.19Ø4E Ø2
Ĉ = Ø.2695E Ø6
COST/FT - DOLLARS
DEPTH IN FEET(*1Ø 2)
Ø.ØØ
2Ø.ØØ
4Ø.ØØ
6Ø.ØØ
8Ø.ØØ
1ØØ.ØØ
12Ø.ØØ
14Ø.ØØ
16Ø.ØØ
18Ø.ØØ
8.ØØ
16.ØØ
24.ØØ
32.ØØ
4Ø.ØØ
48.ØØ
56.ØØ
64.ØØ

Table 2a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN ARKANSAS

(in dollars)

```
   DEPTH
    18000.feet
  TOTAL COST
           7822.50000
          13454.00000
          18511.50000
          24612.00000
          33372.50100
          46410.00100
          65341.50100
          91784.00200
         127354.50000
         173670.00000
         232347.50000
         305004.00000
         393256.51000
         498722.01000
         623017.51000
         767760.01000
         934566.51000
        1125054.00000
MINIMUM AVERAGE COST DEPTH
                3532.feet
MINIMUM MARGINAL COST DEPTH
                2355.feet
MARGINAL COST
              6.45750
              5.07500
              5.30950
              7.16100
             10.62950
             15.71500
             22.41750
             30.73700
             40.67350
             52.22700
             65.39750
             80.18500
             96.58950
            114.61100
            134.24950
            155.50500
            178.37750
            202.86700
POINT OF INFLECTION
        21527.17800
MINIMUM AVERAGE COST
             6.09409
MINIMUM MARGINAL COST
              4.97312
```

Table 3

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN ARKANSAS

$$\hat{Y} = 9.11 - 0.2(10^{-2})X_1 + 0.23(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1065.	1134225.	7.6000	7.2468	0.3532
2	2102.	4418404.	5.8200	5.9330	-0.1130
3	3315.	10989225.	4.4900	5.0280	-0.5380
4	4584.	21013056.	4.8300	4.8105	0.0195
5	6679.	44609041.	6.3500	6.0831	0.2669
6	8760.	76737600.	9.4500	9.3592	0.0908
7	11780.	169384200.	17.6400	17.6800	-0.0400
8	14011.	198154060.	26.5000	26.5393	-0.0393

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.91144027E 01	0.33206112E-00	0.27447967E 02	0.09999999E 01	0.
-0.20001819E-02	0.11244711E-03	-0.17787756E 02	0.65369999E 04	0.87115944E 00
0.23152085E-06	0.73346759E-08	0.31565247E 02	0.61747258E 08	0.96053169E 00

RSQ =	0.9988
R =	0.9994
F(2, 5)=	2074.3122
SUMUSQ =	0.5100
DURBIN-W.=	1.6042

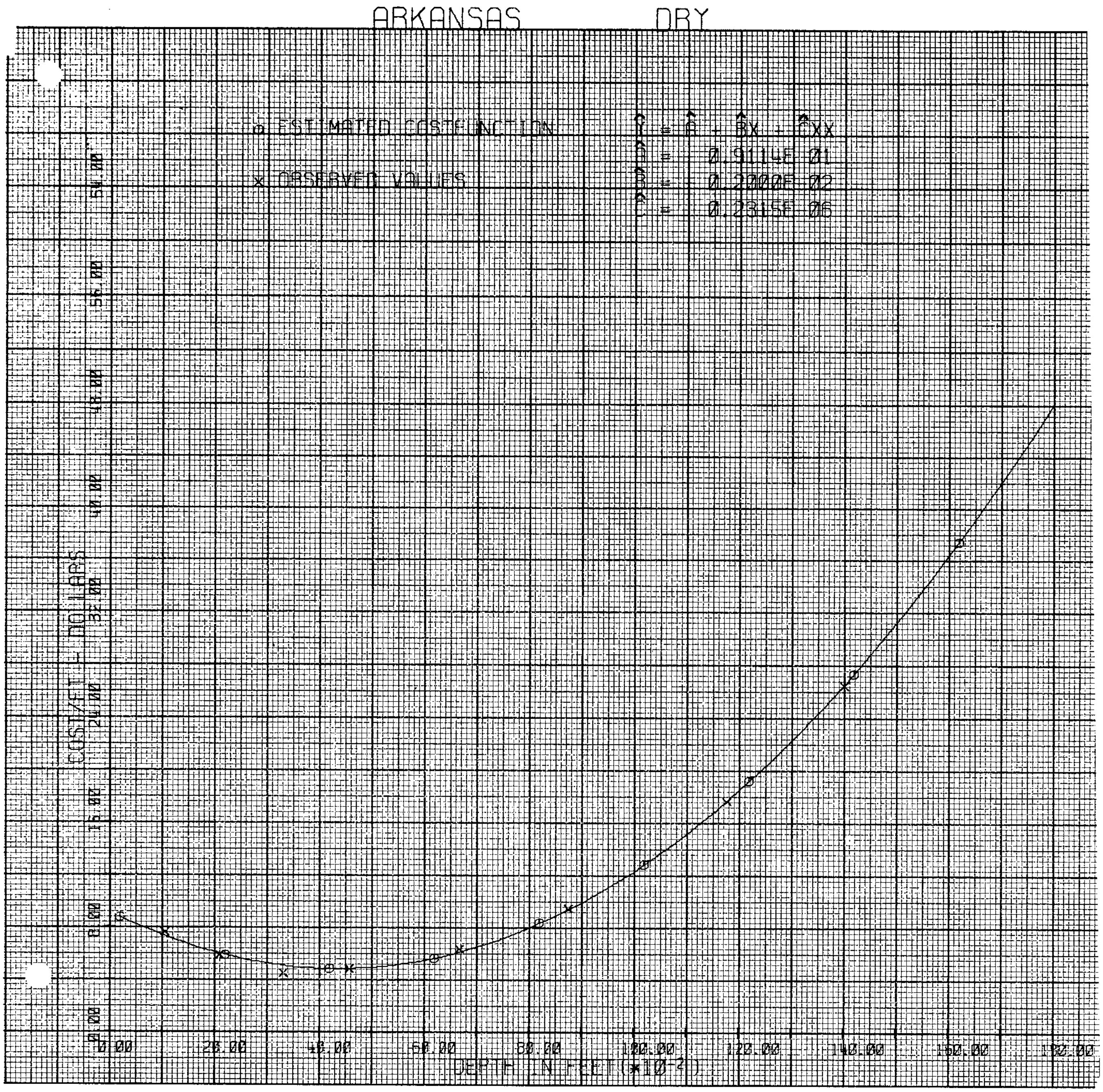

ARKANSAS DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.9114E Ø1
B̂ = Ø.2ØØØE Ø2
Ĉ = Ø.2315E Ø6
COST/FT - DOLLARS
Ø.ØØ
8.ØØ
16.ØØ
24.ØØ
32.ØØ
4Ø.ØØ
48.ØØ
56.ØØ
64.ØØ
Ø.ØØ
2Ø.ØØ
4Ø.ØØ
6Ø.ØØ
8Ø.ØØ
1ØØ.ØØ
12Ø.ØØ
14Ø.ØØ
16Ø.ØØ
18Ø.ØØ
DEPTH IN FEET(*1Ø^-2)

Table 3a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN ARKANSAS

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
          7345.50010
         12080.00000
         15592.50000
         19272.00100
         24507.50100
         32688.00100
         45202.50100
         63440.00100
         88789.50400
        122640.00000
        166380.51000
        221400.00000
        289087.51000
        370832.00000
        468022.51000
        582048.01000
        714297.52000
        866160.02000
MINIMUM AVERAGE COST DEPTH
              4320. feet
MINIMUM MARGINAL COST DEPTH
              2880. feet
MARGINAL COST
             5.80850
             3.89200
             3.36450
             4.22600
             6.47650
            10.11600
            15.14450
            21.56200
            29.36850
            38.56400
            49.14850
            61.12200
            74.48450
            89.23600
           105.37650
           122.90600
           141.82450
           162.13200
POINT OF INFLECTION
      20709.91600
MINIMUM AVERAGE COST
            4.79435
MINIMUM MARGINAL COST
            3.35446
```

Table 4

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN APPALACHIAN

$$\hat{Y} = 16.96 - 0.28(10^{-2})X_1 + 0.40(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

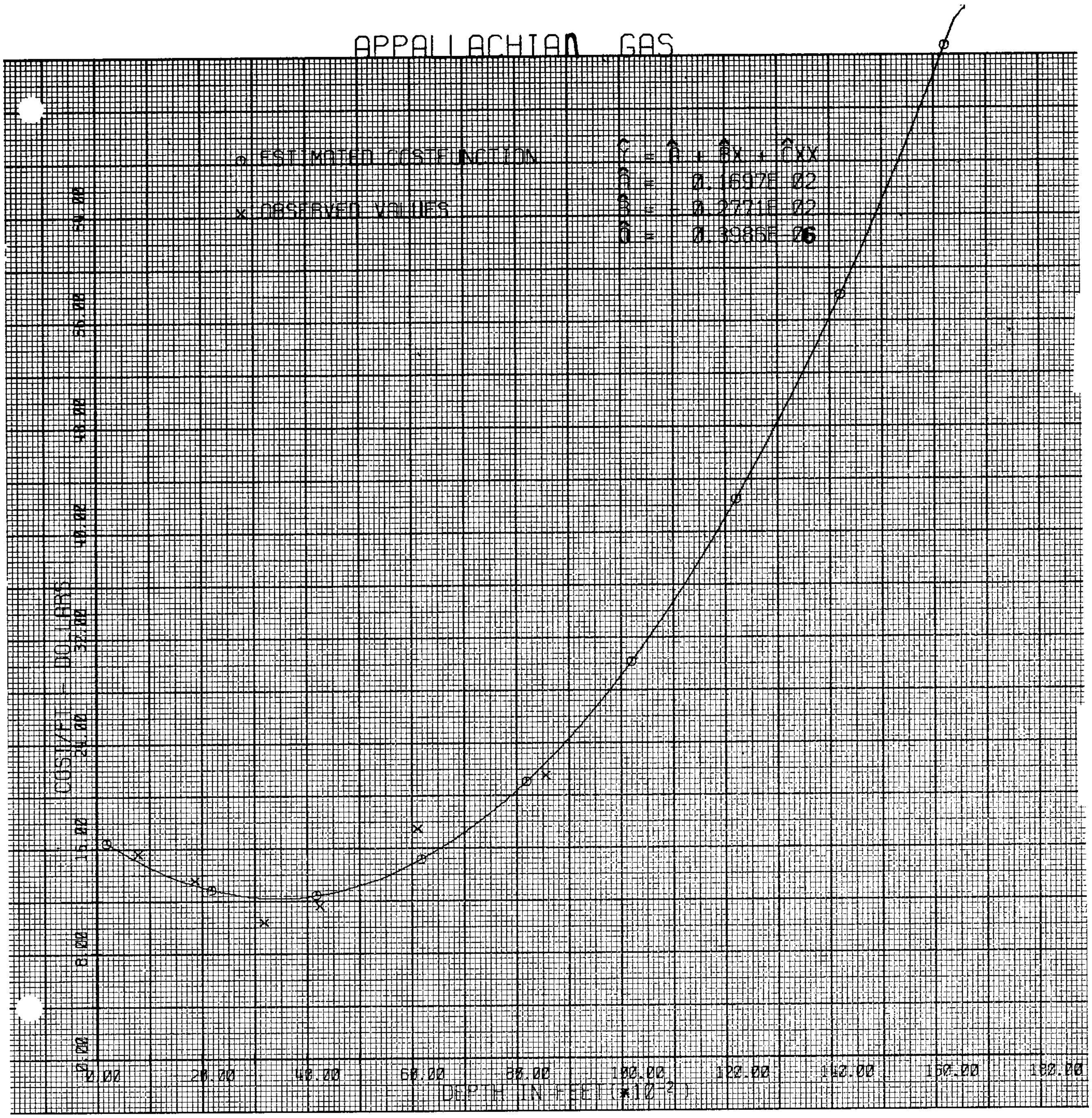
X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	798.	636804.	15.6000	15.0103	0.5897
2	1871.	3500641.	13.5600	13.1789	0.3811
3	3192.	10188864.	10.3600	12.1848	-1.8248
4	4270.	18232900.	11.5800	12.4044	-0.8244
5	6118.	37429924.	17.4800	14.9363	2.5437
6	8552.	73136704.	21.5600	22.4255	-0.8655

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.16967462E 02	0.24796499E 01	0.68426846E 01	0.09999999E 01	0.
-0.27707126E-02	0.12759406E-02	-0.21715058E 01	0.41334999E 04	0.66553251E 00
0.39861197E-06	0.13217060E-06	0.30158897E 01	0.23854306E 08	0.80290894E 00

RSQ =	J.8618
R =	0.9284
F(2, 3)=	9.3565
SUMUSQ =	11.7221
DURBIN-W.=	2.4635



APPALLACHIAN GAS
ESTIMATED COSTFUNCTION
OBSERVED VALUES
Y = A + BX + CXX
A = 0.1697E 02
B = -0.2771E-02
C = 0.3986E-06
COST/FT - DOLLARS
DEPTH IN FEET (*10^-2)
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00

Table 4a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN APPALACHIAN

(in dollars)

```
 DEPTH
  18000.feet
TOTAL COST
          14597.60000
          26044.80000
          36733.20000
          49054.40000
          65400.00100
          88161.60100
         119730.80000
         162499.20000
         218858.40000
         291200.00000
         381915.60000
         493396.80000
         628035.20000
         788222.39000
         976350.00000
        1194809.60000
        1445992.80000
        1732291.20000
MINIMUM AVERAGE COST DEPTH
                3476. feet
MINIMUM MARGINAL COST DEPTH
                2317. feet
MARGINAL COST
              12.62380
              10.66920
              11.10620
              13.93480
              19.15500
              26.76680
              36.77020
              49.16520
              63.95180
              81.13000
             100.69980
             122.66120
             147.01420
             173.75880
             202.89500
             234.42280
             268.34221
             304.65321
POINT OF INFLECTION
          42246.69300
MINIMUM AVERAGE COST
              12.15412
MINIMUM MARGINAL COST
              10.54883
```

Table 5

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN APPALACHIAN

$\hat{Y} = 7 - 0.10(10^{-2})X_1 + 0.27(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

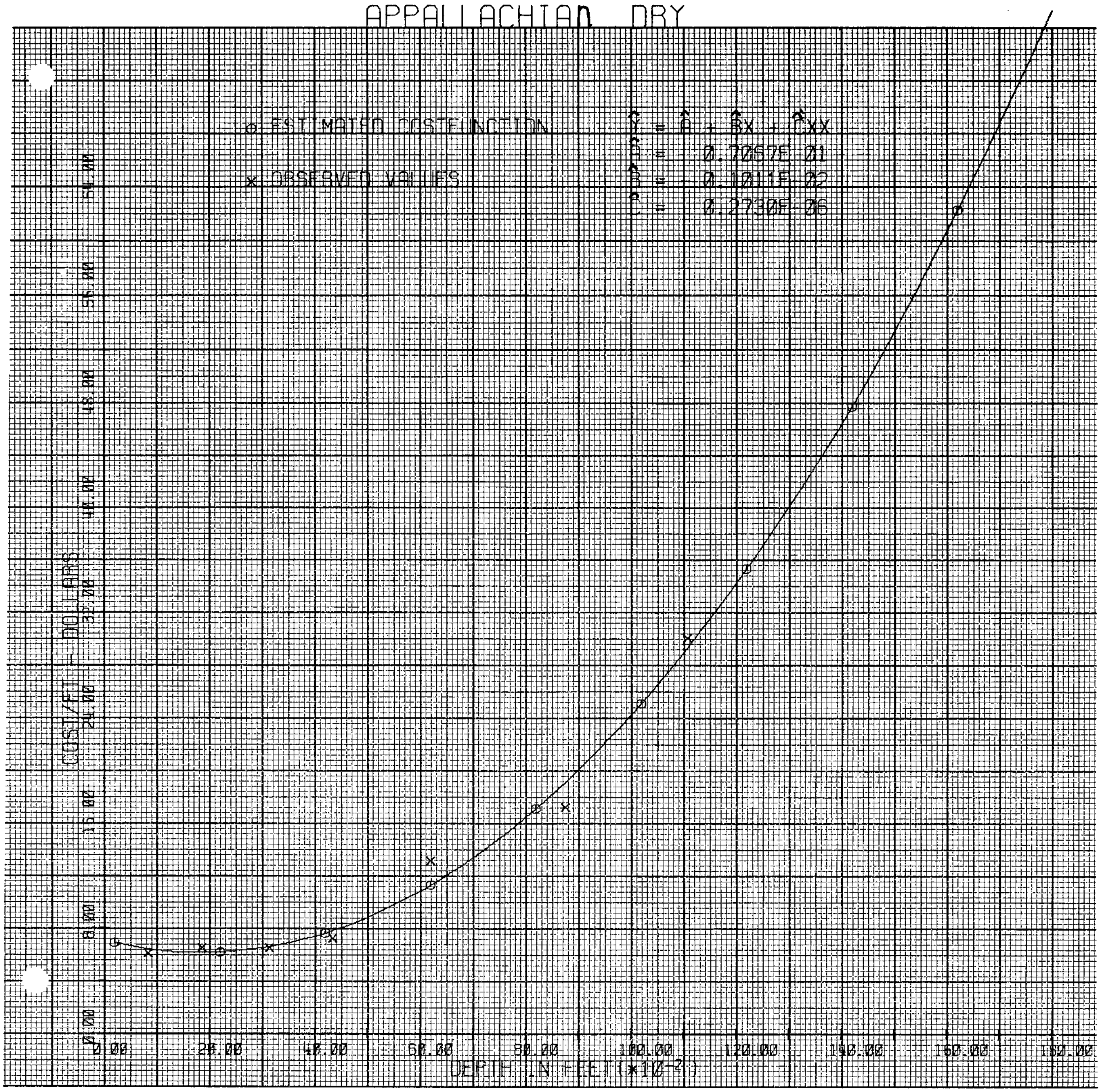
X_1 = Depth

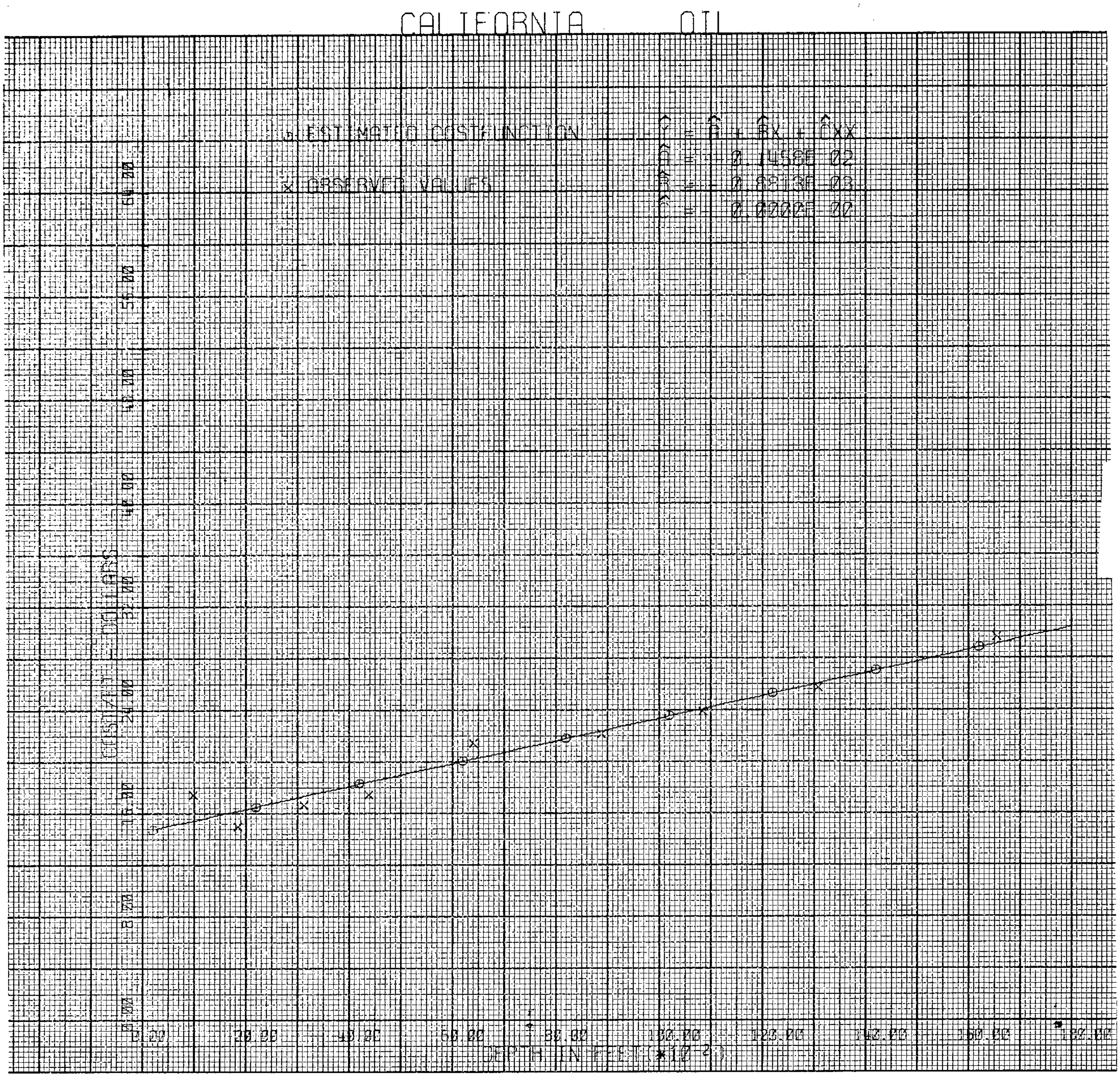
X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	849.	720801.	6.1200	6.4050	-0.2850
2	1867.	3485689.	6.4700	6.1301	0.3399
3	3144.	9884736.	6.5200	6.5851	-0.0651
4	4341.	18844281.	7.1800	7.8200	-0.6400
5	6195.	38378025.	13.1500	11.2766	1.8734
6	8755.	76650025.	17.1800	19.1338	-1.9538
7	11074.	122633476.	30.0700	29.3396	0.7304

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.70669841E 01	0.16078386E 01	0.43953314E 01	0.09999999E 01	0.
-0.10114302E-02	0.67878664E-03	-0.14900562E 01	0.51750000E 04	0.93483800E 00
0.27295288E-06	0.55596265E-07	0.49095543E 01	0.38656718E 08	0.98594870E 00

RSQ =	0.9821
R =	0.9910
F(2, 4)=	109.4536
SUMUSQ =	8.4710
DURBIN-W.=	3.4299


APPALLACHIAN DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.7Ø57E Ø1
B̂ = -Ø.1Ø11E-Ø2
Ĉ = Ø.273ØE-Ø6
COST/FT - DOLLARS
DEPTH IN FEET (*1Ø-2)



CALIFORNIA OIL
ESTIMATED COST FUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET (*10 2)

Table 7

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN CALIFORNIA

$\hat{Y} = 10 - 0.11(10^{-2})X_1 + 0.15(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

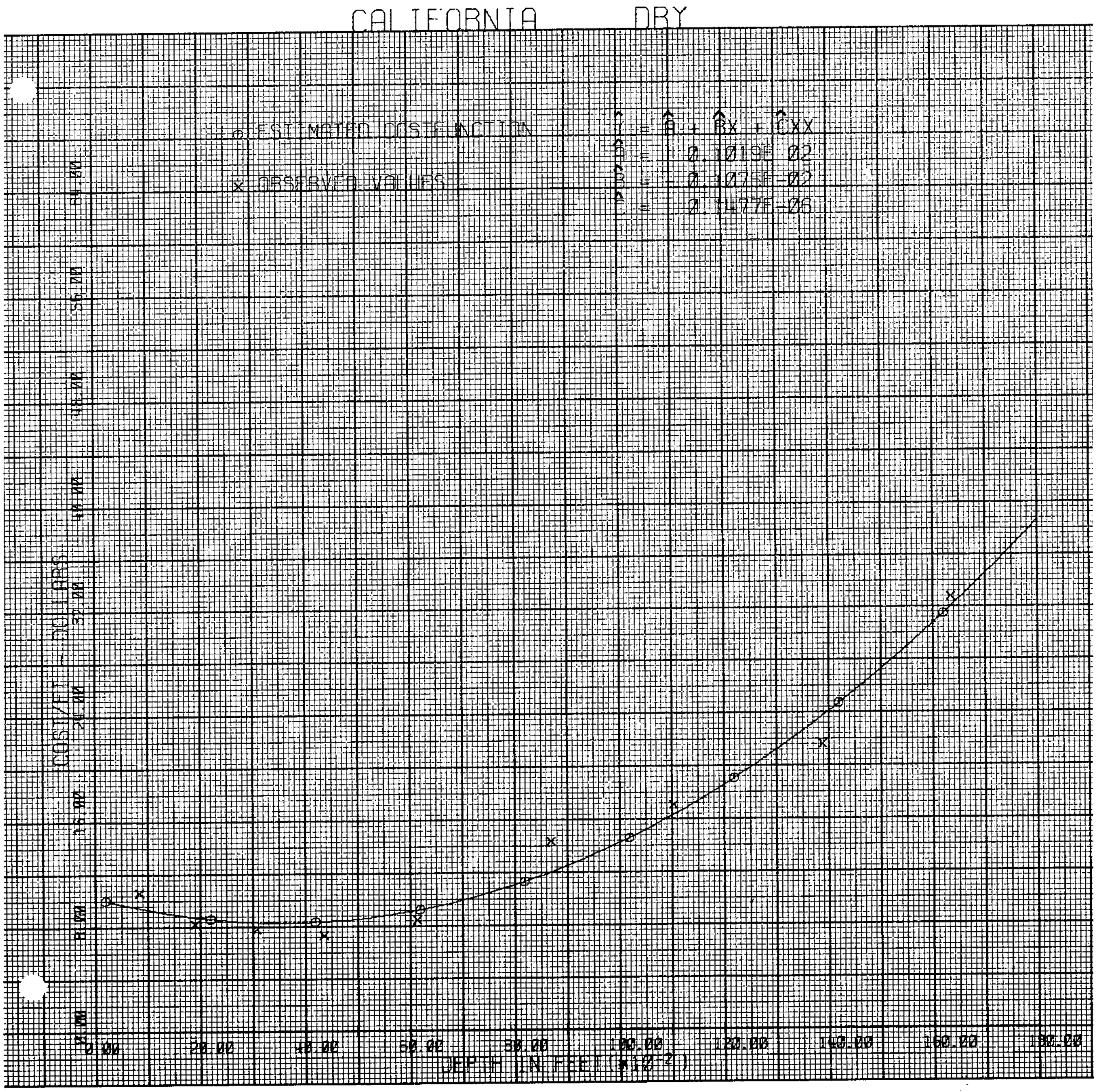
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	848.	719104.	10.5800	9.3871	1.1929
2	1893.	3583449.	8.1800	8.6865	-0.5065
3	3085.	9517225.	7.7600	8.2813	-0.5213
4	4367.	19070689.	7.2600	8.3139	-1.0539
5	6134.	37625956.	8.4000	9.1547	-0.7547
6	8707.	75811849.	14.3100	12.0284	2.2816
7	11033.	121727089.	17.0400	16.3094	0.7306
8	13890.	196466050.	21.6200	23.7548	-2.1348
9	16333.	133383444.	32.8000	32.0339	0.7661

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.10192630E 02	0.13777641E 01	0.73979501E 01	0.09999999E 01	0.
-0.10752305E-02	0.41833092E-03	-0.25702869E 01	0.73655555E 04	0.90509595E 00
0.14770563E-06	0.24128724E-07	0.61215682E 01	0.80861593E 08	0.97343295E 00

RSQ = 0.9750
R = 0.9874
F(2, 6)= 117.2245
SUMUSQ = 14.5157
DURBIN-W.= 2.1709



CALIFORNIA DRY
ESTIMATED COST FUNCTION
X OBSERVED VALUES
Y = A + BX + CXX
A = 0.1019E 02
B = -0.1076E-02
C = 0.1477E-06
COST/FT - DOLLARS
DEPTH IN FEET (×10⁻²)

Table 7a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN CALIFORNIA

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          9262.69990
         17261.60000
         24882.90100
         33012.30000
         42537.50100
         54343.20100
         69316.10000
         88342.40100
        112308.30000
        142100.00000
        178603.70000
        222705.60000
        275291.90000
        337248.80000
        409462.51000
        492819.20000
        588205.11000
        696506.41000
MINIMUM AVERAGE COST DEPTH
                3639. feet
MINIMUM MARGINAL COST DEPTH
                2426. feet
MARGINAL COST
              8.48310
              7.66240
              7.72790
              8.67960
             10.51750
             13.24160
             16.85190
             21.34840
             26.73110
             33.00000
             40.15510
             48.19640
             57.12390
             66.93760
             77.63750
             89.22360
            101.69590
            115.05440
POINT OF INFLECTION
         29964.50000
MINIMUM AVERAGE COST
              8.23397
MINIMUM MARGINAL COST
              7.58195
```

Table 8

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN COLORADO

$\hat{Y} = 22 - 0.6(10^{-2})X_1 + 0.78(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	OBSERVED VALUES X_2	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	727.	528529.	17.1000	18.2468	-1.1468
2	1705.	2907025.	15.0500	14.1729	0.8771
3	2955.	8732025.	12.5500	11.1543	1.3957
4	4283.	18344089.	10.4300	10.6374	-0.2074
5	5867.	34421689.	12.1400	13.6452	-1.5052
6	8409.	70711281.	27.3000	26.7133	0.5867

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.22249128E 02	0.17869822E 01	0.12450670E 02	0.09999999E 01	0.
-0.60764775E-02	0.95227242E-03	-0.63810284E 01	0.39910000E 04	0.49876572E-00
0.78574805E-06	0.10132395E-06	0.77548098E 01	0.22607439E 08	0.69269755E 00

RSQ =	0.9643
R =	0.9820
F(2, 3)=	40.5223
SUMUSQ =	6.6853
DURBIN-W.=	1.9439

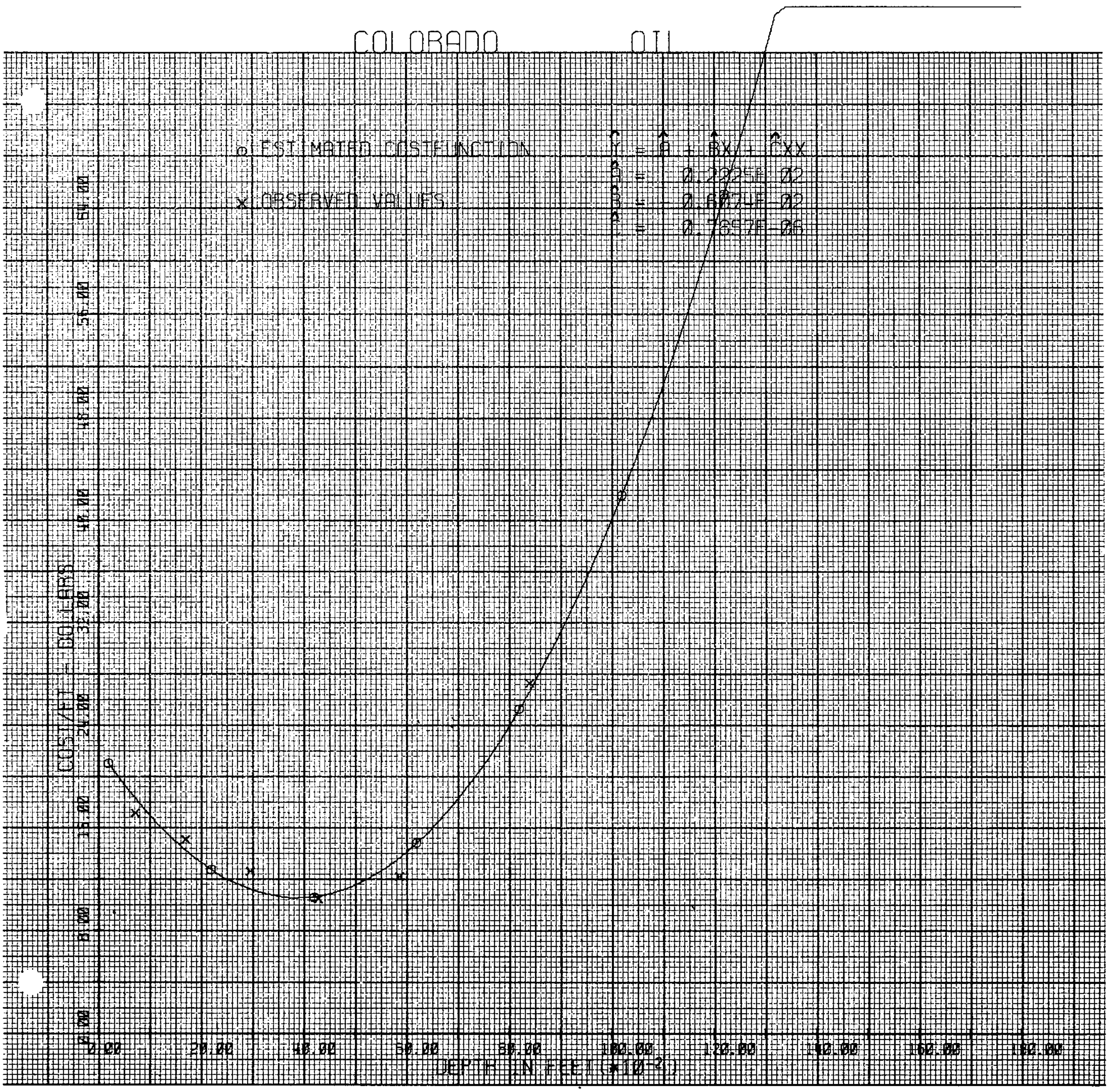

COLORADO OIL
ESTIMATED COSTFUNCTION
X OBSERVED VALUES
Y = A + BX + CXX
A = 0.2225E 02
C = 0.7657E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10⁻²)

Table 8a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN COLORADO

(in dollars)

```
  DEPTH
   18000.feet
 TOTAL COST
         16961.70000
         26489.60000
         33297.90000
         42100.80000
         57612.50100
         84547.20000
        127619.10000
        191542.40000
        281031.30000
        400800.01000
        555562.70000
        750033.60000
        988926.90000
       1276956.80000
       1618837.50000
       2019283.20000
       2483008.10000
       3014726.50000
MINIMUM AVERAGE COST DEPTH
                3865. feet
MINIMUM MARGINAL COST DEPTH
                2577.feet
MARGINAL COST
            12.45910
             7.38240
             7.01990
            11.37160
            20.43750
            34.21760
            52.71190
            75.92040
           103.84310
           136.48000
           173.83110
           215.89640
           262.67590
           314.16960
           370.37750
           431.29960
           496.93590
           567.28640
POINT OF INFLECTION
        40628.44000
MINIMUM AVERAGE COST
            10.51095
MINIMUM MARGINAL COST
             6.59794
```

Table 9

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN COLORADO

$\hat{Y} = 20 - 0.57\,(10^{-2})X_1 + 0.59(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	OBSERVED VALUES X_2	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	740.	547600.	15.6900	16.0885	-0.3985
2	1637.	2679769.	12.2500	12.2221	0.0279
3	2922.	8538084.	9.2900	8.3504	0.9396
4	4157.	17280649.	6.2900	6.4797	-0.1897
5	5795.	33582025.	6.3200	6.7965	-0.4765
6	8493.	72131049.	14.2700	14.2737	-0.0037
7	10753.	115627009.	27.3000	27.1991	0.1009

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19998342E 02	0.60396262E 00	0.33111887E 02	0.09999999E 01	0.
-0.57235704E-02	0.26784114E-03	-0.21369272E 02	0.49281428E 04	0.53758558E 00
0.59455232E-06	0.22768743E-07	0.26112653E 02	0.35769454E 08	0.72282435E 00

RSQ = 0.9959
R = 0.9979
F(2, 4)= 480.3265
SUMUSQ = 1.3157
DURBIN-W.= 1.9800

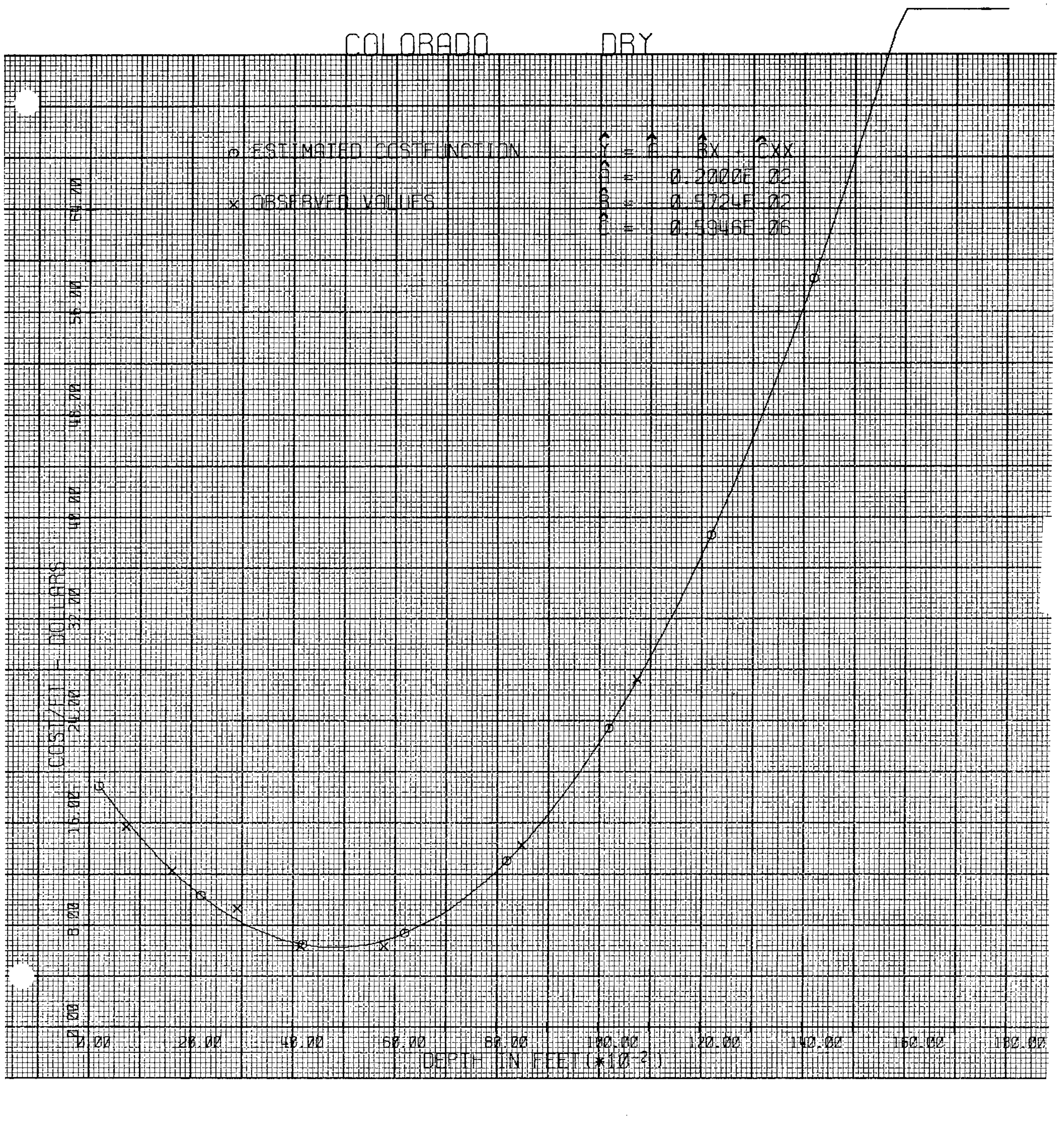

COLORADO DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.2000E 02
B̂ = 0.5724E 02
Ĉ = 0.5346E 06
COST/FT - DOLLARS
DEPTH IN FEET (*10-2)

Table 9a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN COLORADO

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          14870.60000
          21860.80000
          24538.20000
          26470.40000
          31224.99900
          42369.59900
          63471.79700
          98099.19900
         149819.40000
         222200.00000
         318808.59000
         443212.80000
         598980.20000
         789678.39000
        1018875.00000
        1290137.60000
        1607033.80000
        1973131.20000
MINIMUM AVERAGE COST DEPTH
                4813. feet
MINIMUM MARGINAL COST DEPTH
                3209. feet
MARGINAL COST
             10.33580
              4.23920
              1.71020
              2.74880
              7.35500
             15.52880
             27.27020
             42.57920
             61.45580
             83.90000
            109.91180
            139.49120
            172.63820
            209.35280
            249.63500
            293.48480
            340.90220
            391.88720
POINT OF INFLECTION
         29959.44200
MINIMUM AVERAGE COST
              6.22428
MINIMUM MARGINAL COST
              1.63237
```

Table 10

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN KENSAS

$$\hat{Y} = 8.60 - 0.80(10^{-3})X_1 + 0.20(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

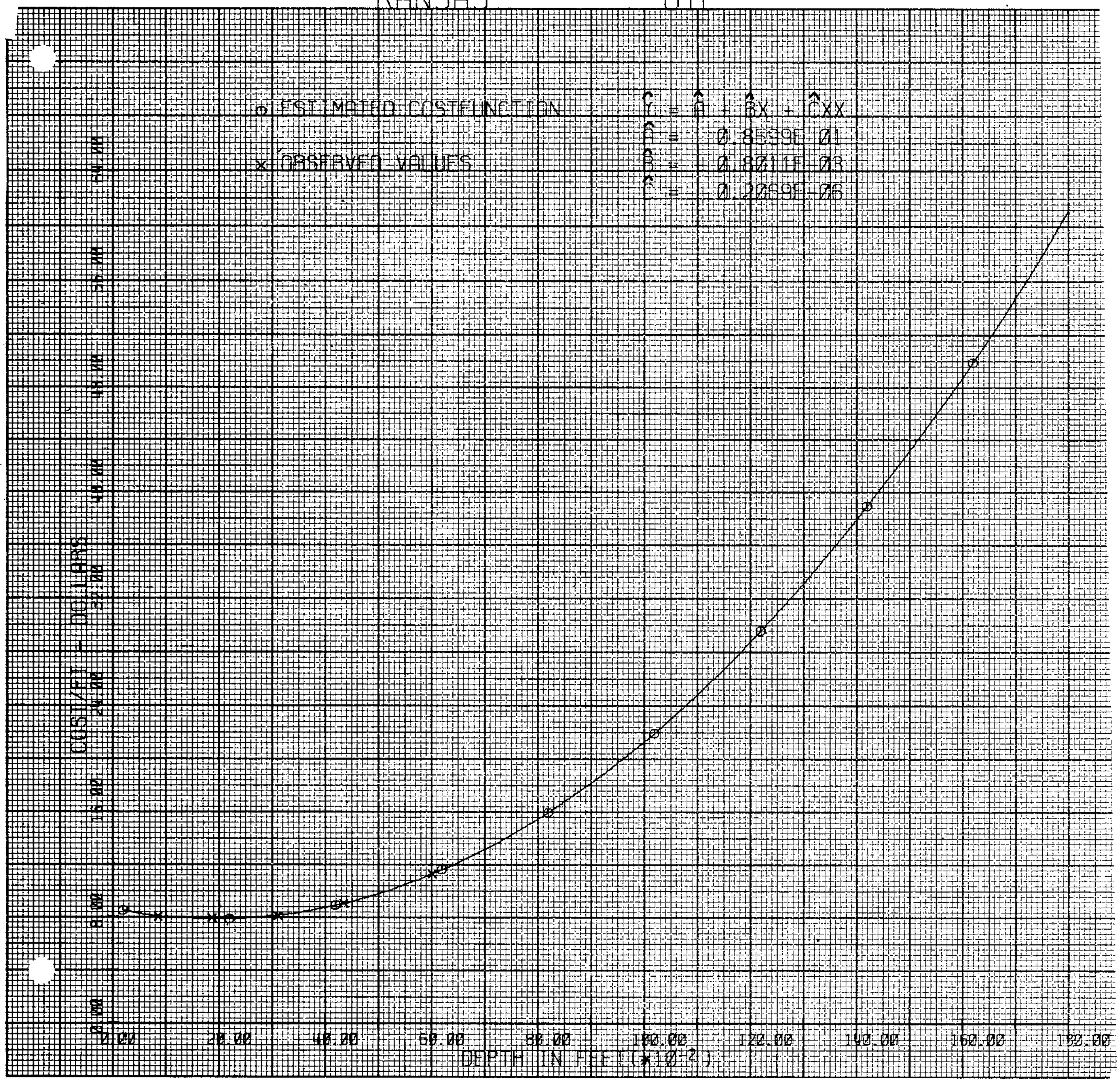
X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	870.	756900.	8.0100	8.0591	-0.0491
2	1881.	3538161.	7.9200	7.8246	0.0954
3	3127.	9778129.	8.0900	8.1173	-0.0273
4	4369.	19088161.	9.0100	9.0484	-0.0384
5	6012.	36144144.	11.2800	11.2606	0.0194

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.85994167E 01	0.13854218E-00	0.62070745E 02	0.09999999E 01	0.
-0.80106035E-03	0.95110872E-04	-0.84223846E 01	0.32517999E 04	0.89016402E 00
0.20687184E-06	0.13474621E-07	0.15352701E 02	0.13861099E 08	0.96762513E 00

RSQ =	0.9983
R =	0.9991
F(2, 2)=	571.4864
SUMUSQ =	0.0141
DURBIN-W.=	2.7928

KANSAS OIL



o ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.8539E 01
B̂ = -0.8011E-03
Ĉ = 0.2069E-06
COST/FT - DOLLARS
DEPTH IN FEET(*10^2)

Table 10a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN KANSAS

(in dollars)

```
DEPTH
  18000.feet
TOTAL COST
         8004.80010
        15648.80000
        24173.40000
        34820.00000
        48830.00100
        67444.80100
        91905.80100
       123454.40000
       163332.00000
       212780.00000
       273039.80000
       345352.80000
       430960.40000
       531104.00000
       647025.00000
       779964.80000
       931164.81000
      1101866.40000
MINIMUM AVERAGE COST DEPTH
            1936.feet
MINIMUM MARGINAL COST DEPTH
            1291.feet
MARGINAL COST
            7.61750
            7.87740
            9.37870
           12.12140
           16.10550
           21.33100
           27.79790
           35.50620
           44.45590
           54.64700
           66.07950
           78.75340
           92.66870
          107.82540
          124.22350
          141.86300
          160.74390
          180.86620
POINT OF INFLECTION
       15146.07800
MINIMUM AVERAGE COST
            7.82355
MINIMUM MARGINAL COST
            7.56507
```

Table 11

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN KENTUCKY

$\hat{Y} = 3.80 + 0.27(10^{-2})X$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X = Depth

SAMPLE NUMBER	OBSERVED VALUES X	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	836.	7.8200	6.0582	1.7618
2	1819.	5.0600	8.7244	-3.6644
3	3019.	13.5000	11.9791	1.5209
4	4295.	16.4000	15.4399	0.9601
5	6090.	19.7300	20.3084	-0.5784

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.37907695E 01	0.23210088E 01	0.16332421E 01	0.09999999E 01	0.
0.27122580E-02	0.62635265E-03	0.43302410E 01	0.32117999E 04	0.92848005E 00

RSQ =	0.8621
R =	0.9285
F(1, 3)=	18.7510
SUMUSQ =	20.1010
DURBIN-W.=	2.9358

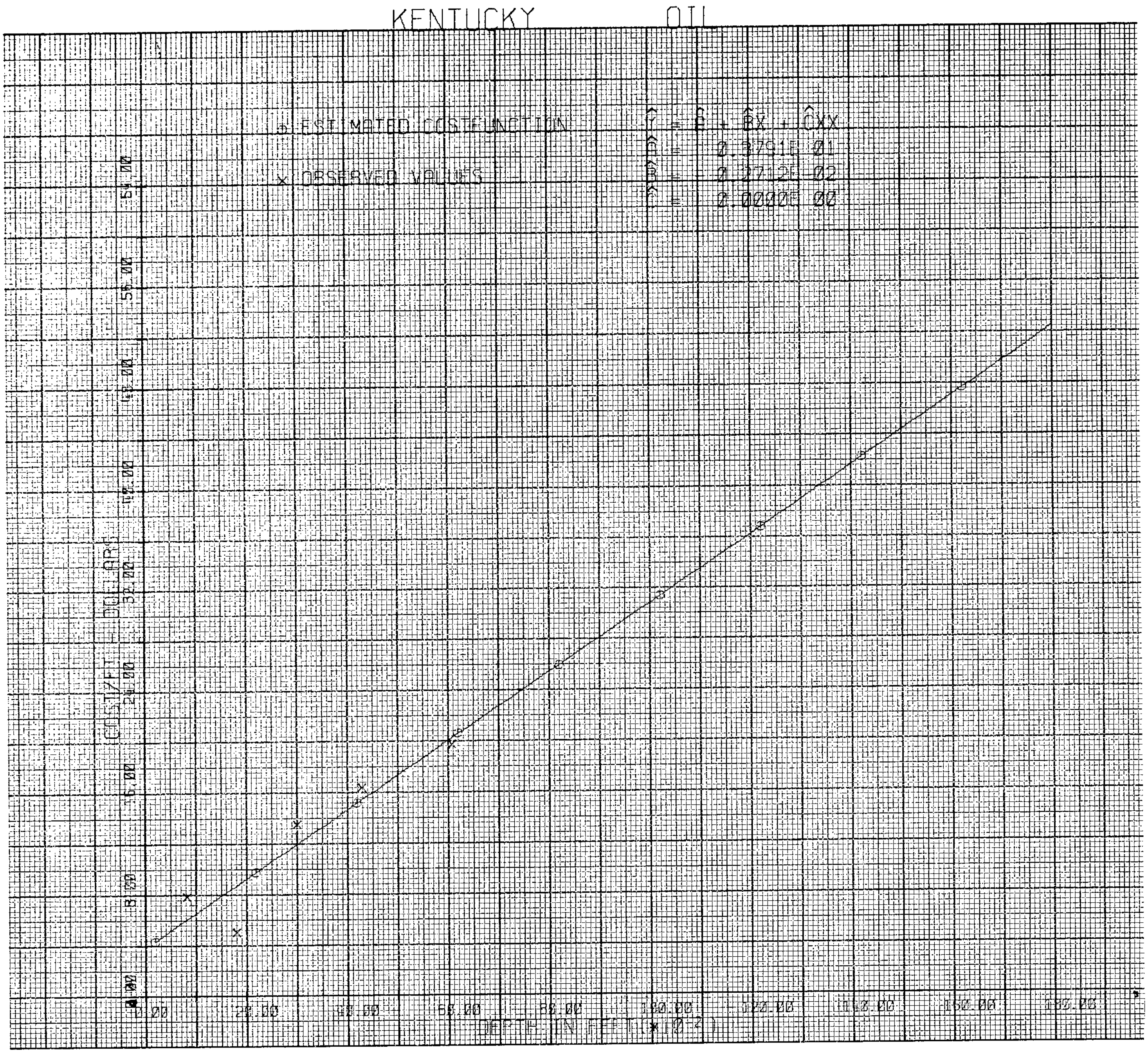

KENTUCKY OIL
ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.3791E 01
B̂ = 0.2712E-02
Ĉ = 0.0000E 00
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10 2)

Table 12

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN KENTUCKY

$\hat{Y} = 5.04 + 0.53(10^{-3})\ X$

Where:

$\hat{Y}$ = **Estimated drilling cost per foot**

X = **Depth**

SAMPLE NUMBER	OBSERVED VALUES X	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	816.	5.9000	5.4839	0.4161
2	1814.	5.4300	6.0180	-0.5880
3	3028.	6.4600	6.6678	-0.2078
4	4171.	7.7500	7.2795	0.4705
5	6677.	8.5300	8.6208	-0.0908

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.50471625E 01	0.43850111E-00	0.11510033E 02	0.09999999E 01	0.
0.53521071E-03	0.11314147E-03	0.47304554E 01	0.33012000E 04	0.93903343E 00

```
      RSQ =    0.8818
        R =    0.9390
 F( 1,  3)=   22.3772
   SUMUSQ =    0.7917
 DURBIN-W.=    2.4352
```

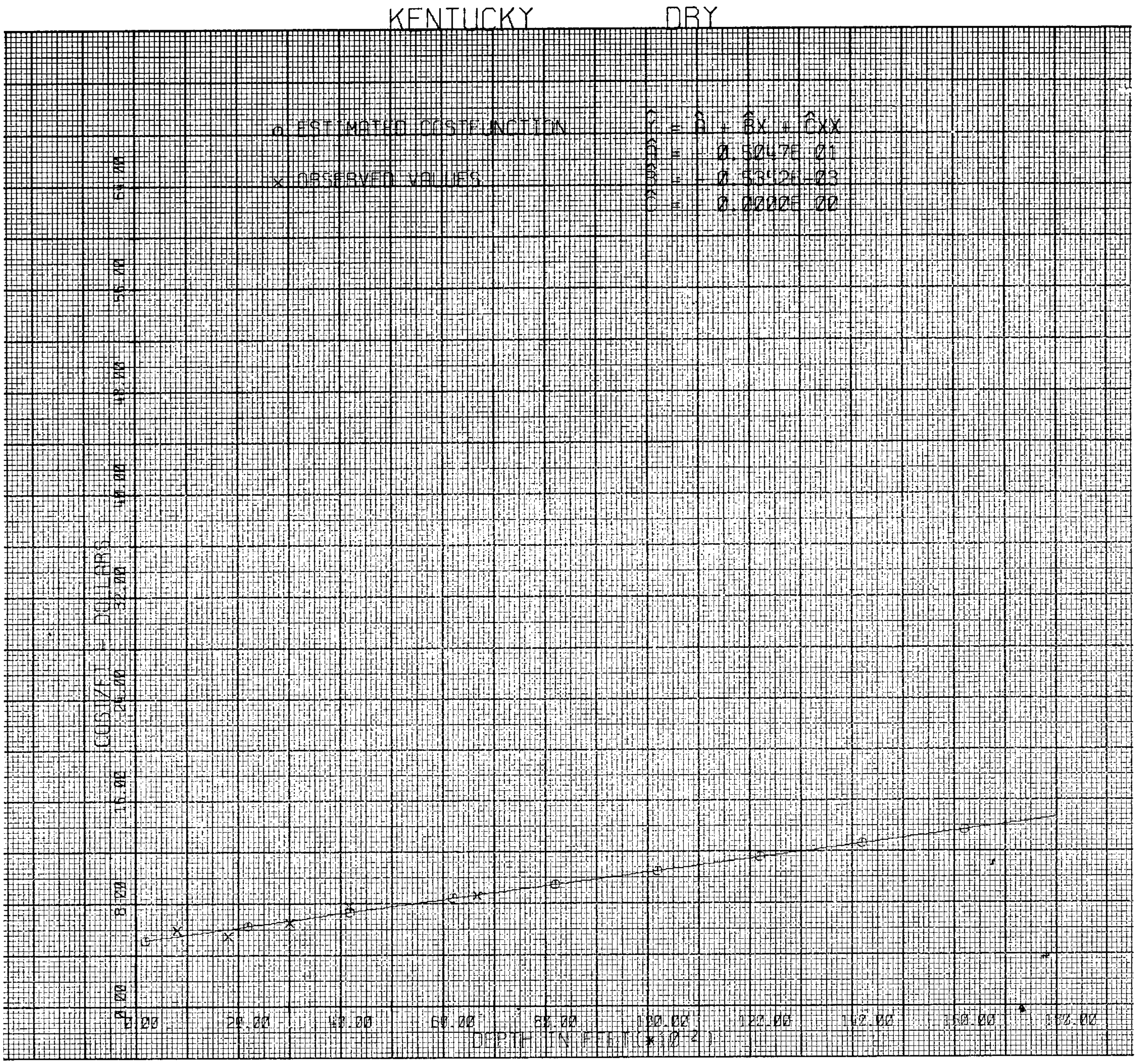

KENTUCKY DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.5047E 01
Ĉ = 0.0000E 00
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10 2)

Table 13

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN NORTH DAKOTA

$\hat{Y} = 3.2 + 0.13(10^{-2})X$

Where:

$\hat{Y}$ = **Estimated drilling cost per foot**

X = **Depth**

SAMPLE NUMBER	OBSERVED VALUES X	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	3294.	8.1200	7.5852	0.5348
2	4442.	9.3700	9.1045	0.2655
3	6603.	10.0000	11.9645	-1.9645
4	8720.	17.5400	14.7663	2.7737
5	11403.	15.3900	18.3171	-2.9271
6	14588.	23.8500	22.5323	1.3177

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.32257318E 01	0.22263015E 01	0.14489195E 01	0.09999999E 01	0.
0.13234578E-02	0.24558997E-03	0.53888918E 01	0.81750000E 04	0.93751547E 00

```
      RSQ =    0.8789
        R =    0.9375
 F( 1,  4)=   29.0402
   SUMUSQ =   22.2136
 DURBIN-W.=    3.5120
```

NORTH DAKOTA OIL

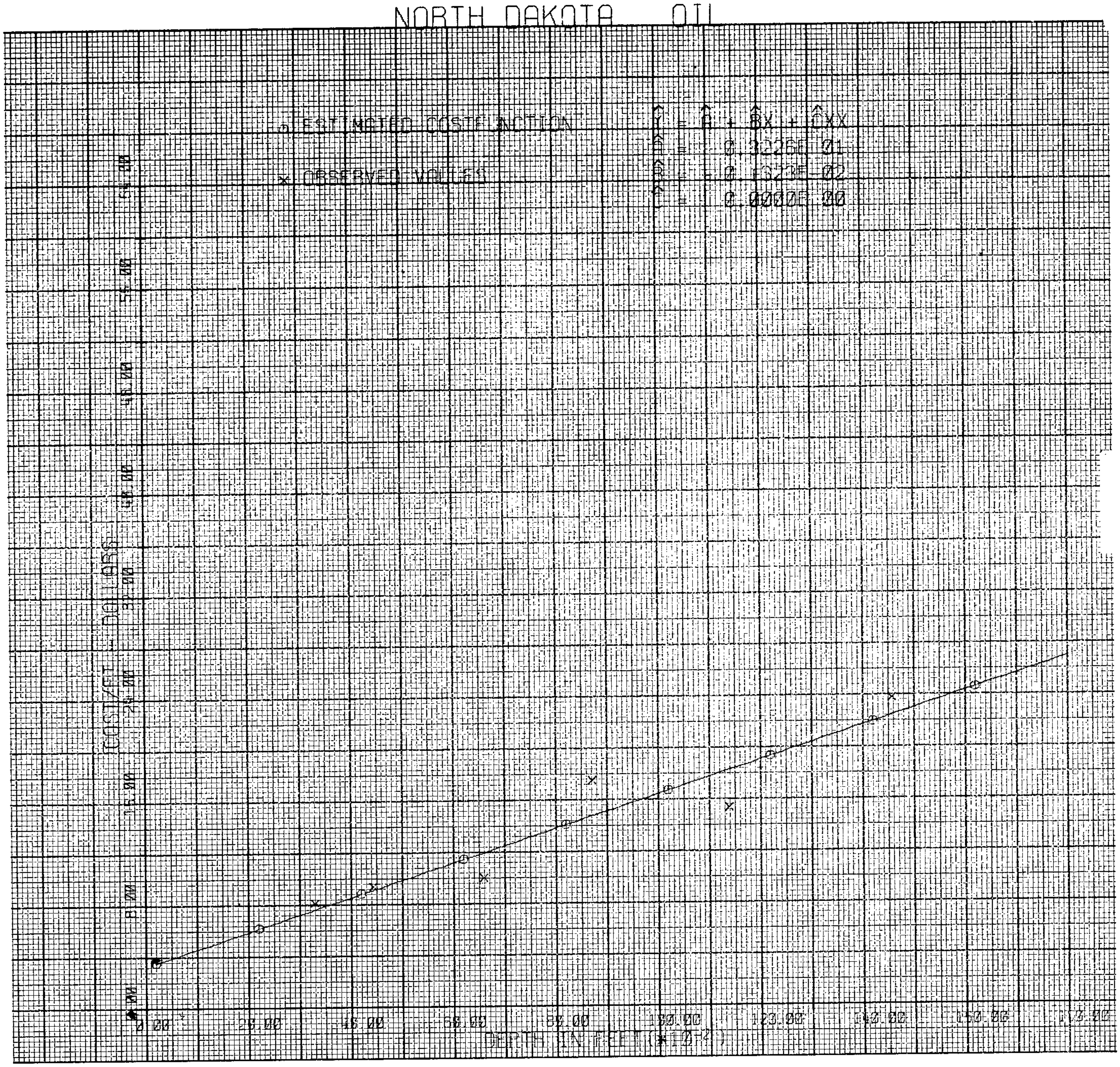


Table 14

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN NORTH LOUISIANA

$\hat{Y} = 8.2 - 0.15(10^{-2})X_1 + 0.26(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	800.	640000.	6.4800	7.1263	-0.6463
2	1770.	3132900.	5.9200	6.2702	-0.3502
3	3064.	9388096.	6.8200	5.8923	0.9277
4	4378.	19166884.	8.1300	6.4024	1.7276
5	6151.	37834801.	7.2800	8.5183	-1.2383
6	8515.	72505225.	12.5800	13.8905	-1.3105
7	10683.	114126489.	22.2700	21.3801	0.8899

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.82016734E 01	0.15830246E 01	0.51810145E 01	0.09999999E 01	0.
-0.15529329E-02	0.69183334E-03	-0.22446632E 01	0.50515714E 04	0.87199655E 00
0.26083722E-06	0.58970150E-07	0.44232077E 01	0.36684912E 08	0.95293786E 00

RSQ =	0.9593
R =	0.9795
F(2, 4)=	47.1706
SUMUSQ =	8.4284
DURBIN-W.=	1.8988

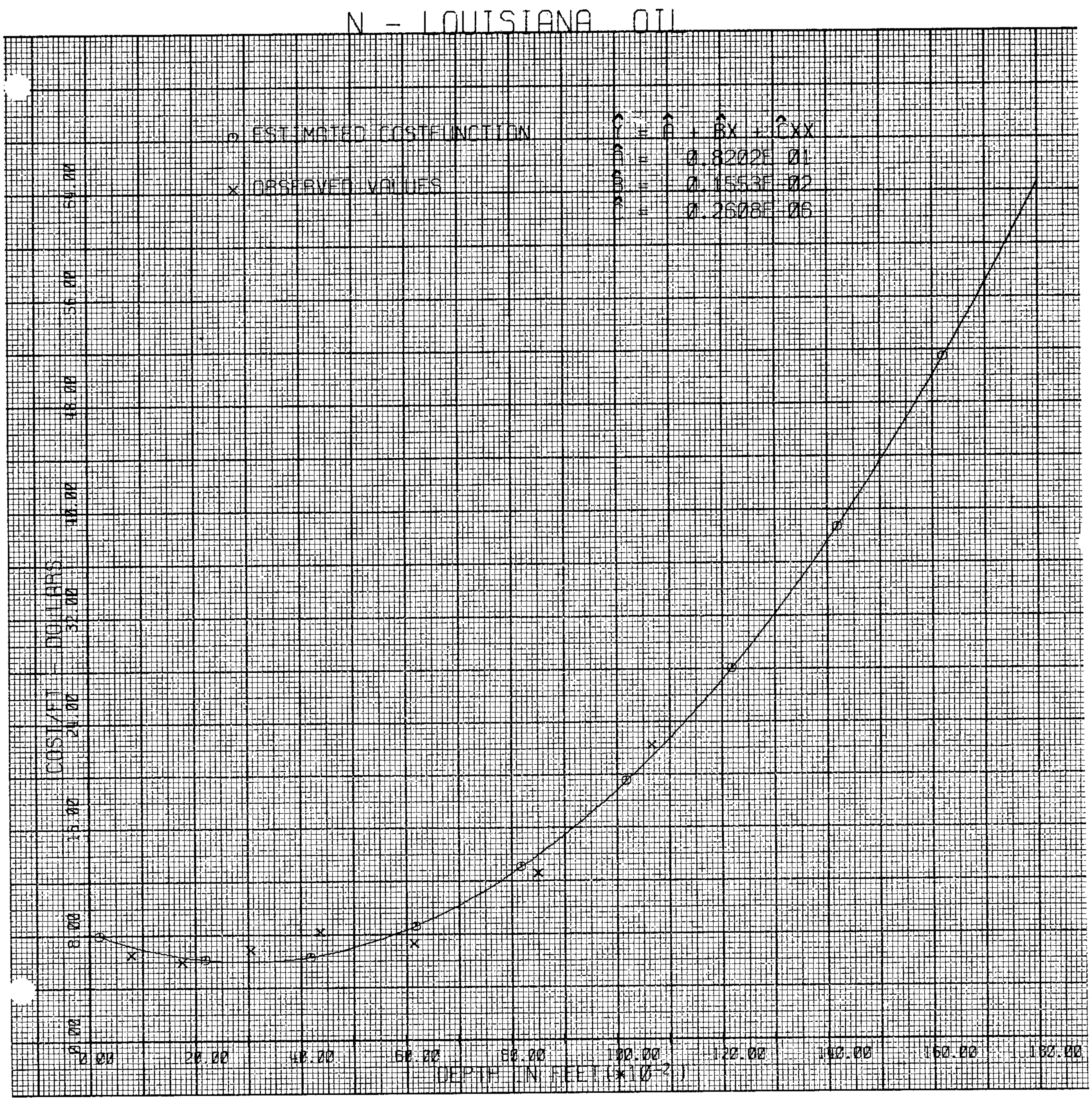

N - LOUISIANA OIL
⊙ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.8202E 01
B̂ = 0.1553E-02
Ĉ = 0.2608E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10^-2)

Table 14a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN NORTH LOUISIANA

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          6909.80000
         12278.40000
         17670.60000
         24651.20000
         34785.00100
         49636.80000
         70771.40000
         99753.59900
        138148.20000
        187520.00000
        249433.80000
        325454.40000
        417146.60000
        526075.19000
        653805.00000
        801900.79000
        971927.40000
       1165449.60000
MINIMUM AVERAGE COST DEPTH
              2977. feet
MINIMUM MARGINAL COST DEPTH
              1985.feet
MARGINAL COST
             5.87840
             5.11960
             5.92560
             8.29640
            12.23200
            17.73240
            24.79760
            33.42760
            43.62240
            55.38200
            68.70640
            83.59560
           100.04960
           118.06840
           137.65200
           158.80040
           181.51360
           205.79160
POINT OF INFLECTION
        17536.95000
MINIMUM AVERAGE COST
             5.89007
MINIMUM MARGINAL COST
             5.11942
```

Table 15

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN NORTH LOUISIANA

$\hat{Y} = 7.4 - 0.11(10^{-2})X_1 + 0.25(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	992.	984064.	6.9500	6.5269	0.4231
2	2131.	4541161.	5.9200	6.1124	-0.1924
3	3216.	10342656.	5.9000	6.3300	-0.4300
4	4526.	20484676.	7.1300	7.3891	-0.2591
5	6635.	44023225.	11.3500	10.9246	0.4254
6	9165.	83997225.	18.6800	18.1451	0.5349
7	10320.	106502400.	22.0200	22.5218	-0.5018

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.74245929E 01	0.68403053E 00	0.10854183E 02	0.09999999E 01	0.
-0.11567045E-02	0.30028611E-03	-0.38520079E 01	0.52835714E 04	0.94054385E 00
0.25383826E-06	0.25575846E-07	0.99249212E 01	0.38696486E 08	0.98934136E 00

```
      RSQ =    0.9955
        R =    0.9977
F( 2,  4)=   442.2111
   SUMUSQ =    1.1869
DURBIN-W.=    1.7017
```

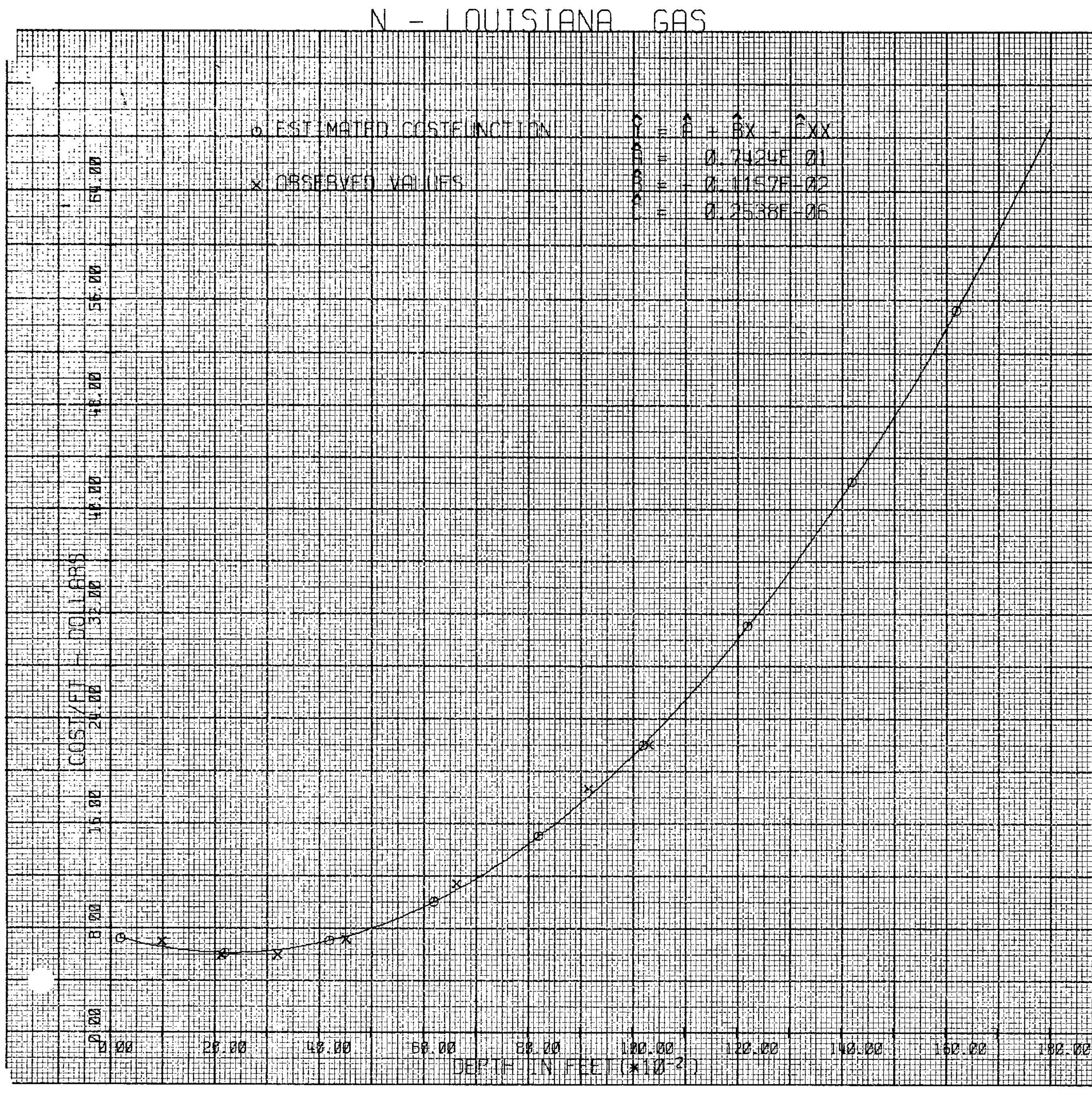

N - LOUISIANA GAS
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET(*10^-2)

Table 15a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN NORTH LOUISIANA

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
           6520.80000
          12250.40000
          18711.60000
          27427.20000
          39920.00100
          57712.80100
          82328.40100
         115289.60000
         158119.20000
         212340.00000
         279474.81000
         361046.41000
         458577.61000
         573591.20000
         707610.01000
         862156.81000
        1038754.40000
        1238925.60000
MINIMUM AVERAGE COST DEPTH
              2279.feet
MINIMUM MARGINAL COST DEPTH
              1520. feet
MARGINAL COST
              5.87140
              5.84160
              7.33460
             10.35040
             14.88900
             20.95040
             28.53460
             37.64160
             48.27140
             60.42400
             74.09940
             89.29760
            106.01860
            124.26240
            144.02900
            165.31840
            188.13061
            212.46560
POINT OF INFLECTION
        13916.35300
MINIMUM AVERAGE COST
            6.10539
MINIMUM MARGINAL COST
            5.66586
```

Table 16

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN SOUTH LOUISIANA

$\hat{Y} = 16.40 - 0.11(10^{-2})X_1 + 0.12(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	1093.	1194649.	13.6500	15.2997	-1.6497
2	1955.	3822025.	16.6100	14.6395	1.9705
3	2997.	8982009.	12.6600	14.0774	-1.4174
4	4528.	20502784.	15.1200	13.7200	1.4000
5	6206.	38514436.	14.8900	13.9686	0.9214
6	8420.	70896400.	14.4200	15.3212	-0.9012
7	11314.	128006596.	19.0200	18.8471	0.1729
8	13669.	193420780.	21.8200	23.1863	-1.3663
9	16611.	268981330.	31.3300	30.4601	0.8699

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.16390815E 02	0.14387243E 01	0.11392603E 02	0.09999999E 01	0.
-0.11282787E-02	0.42787471E-03	-0.26369370E 01	0.74214444E 04	0.85232950E 00
0.11891313E-06	0.24236657E-07	0.49063338E 01	0.81631752E 08	0.93924233E 00

RSQ = 0.9454
R = 0.9723
F(2, 6)= 51.9695
SUMUSQ = 14.8878
DURBIN-W.= 2.9954

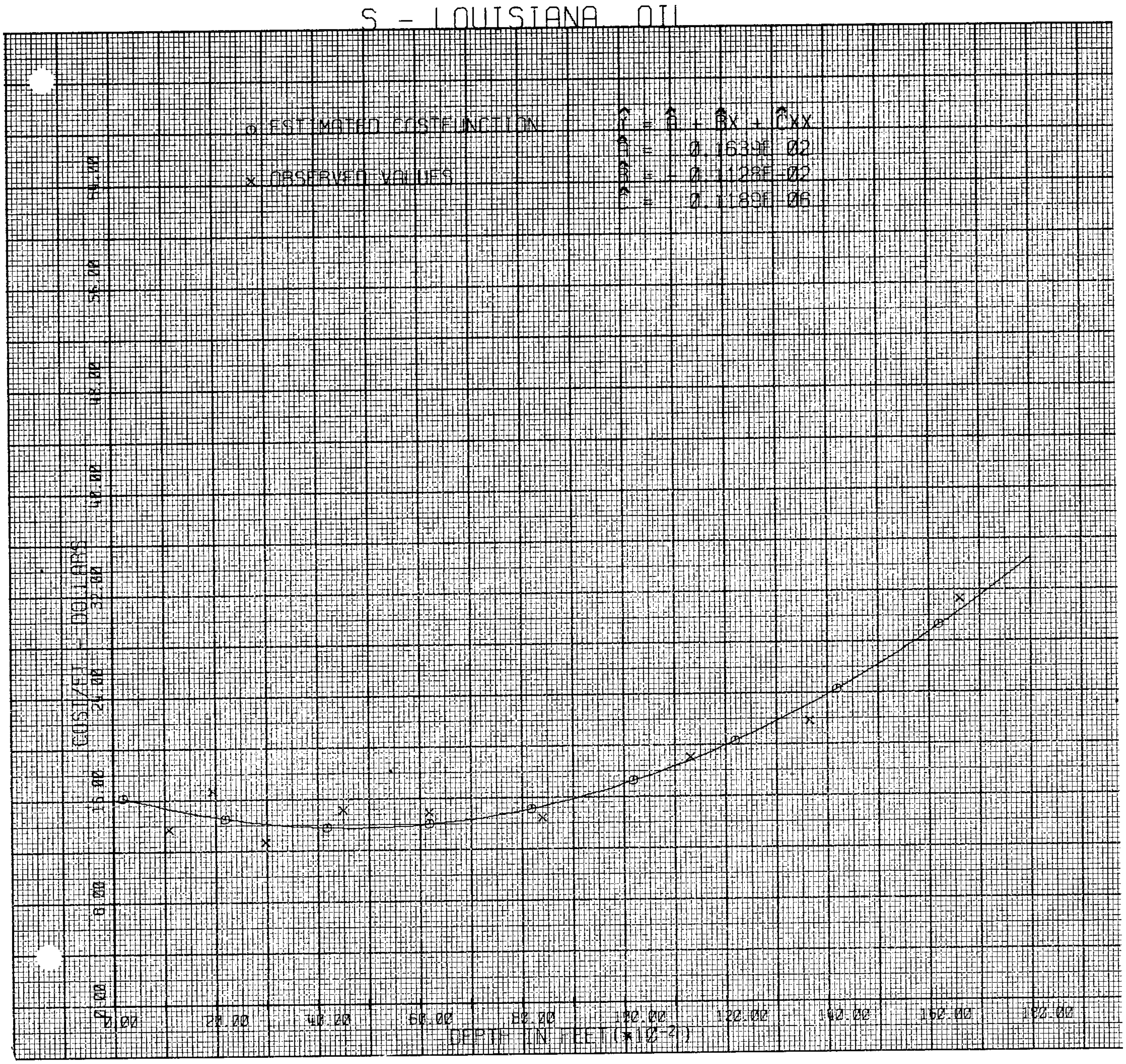

S - LOUISIANA OIL
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ĉ = Â + B̂X + ĈXX
Â = 0.1639E 02
B̂ = -0.1128E-02
Ĉ = 0.1189E 06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10-2)

Table 16a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN SOUTH LOUISIANA

(in dollars)

DEPTH
18000. feet
TOTAL COST
15380.90000
29219.20000
42228.30000
55121.60000
68612.50100
83414.40100
100240.70000
119804.80000
142820.10000
170000.00000
202057.90000
239707.20000
283661.30000
334633.60000
393337.50000
460486.40000
536793.70000
622972.80000
MINIMUM AVERAGE COST DEPTH
4743. feet
MINIMUM MARGINAL COST DEPTH
3162. feet
MARGINAL COST
14.49070
13.30480
12.83230
13.07320
14.02750
15.69520
18.07630
21.17080
24.97870
29.50000
34.73470
40.68280
47.34430
54.71920
62.80750
71.60920
81.12430
91.35280
POINT OF INFLECTION
65055.31900
MINIMUM AVERAGE COST
13.71468
MINIMUM MARGINAL COST
12.82290

Table 17

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN SOUTH LOUISIANA

$$\hat{Y} = 20 - 0.25(10^{-2})X_1 + 0.22(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1156.	1336336.	16.5000	17.4281	-0.9281
2	2207.	4870849.	15.6000	15.6140	-0.0140
3	3457.	11950849.	14.8500	14.0926	0.7574
4	4708.	22165264.	14.3000	13.2622	1.0378
5	6879.	47320641.	13.3700	13.4645	-0.0945
6	9327.	86992929.	15.9900	16.1940	-0.2040
7	11409.	130165281.	19.1300	20.6019	-1.4719
8	13952.	197329152.	29.4500	28.5876	0.8624
9	16633.	269164172.	40.1600	40.1050	0.0550

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19987895E 02	0.91288817E 00	0.21895229E 02	0.09999999E 01	0.
-0.24700807E-02	0.26293816E-03	-0.93941503E 01	0.77475555E 04	0.82127405E 00
0.22121986E-06	0.14754975E-07	0.14992899E 02	0.86235237E 08	0.93116445E 00

RSQ = 0.9915
R = 0.9958
F(2, 6)= 351.5016
SUMUSQ = 5.4761
DURBIN-W.= 1.9196

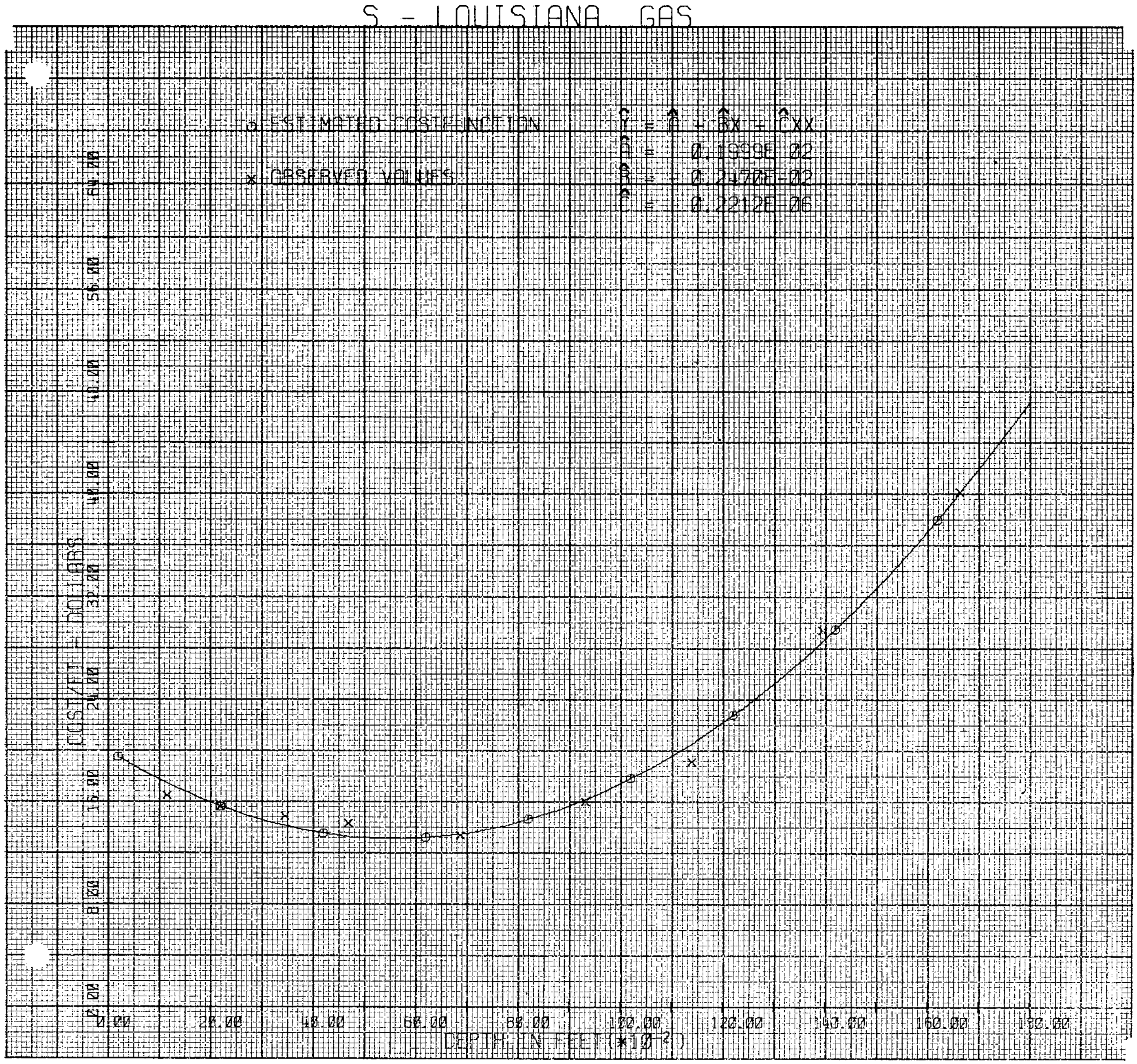

S - LOUISIANA GAS
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET(*10^-2)

Table 17a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN SOUTH LOUISIANA

(in dollars)

```
 DEPTH
  18000. feet
 TOTAL COST
        17741.20000
        31869.60000
        43712.40000
        54596.80100
        65850.00000
        78799.20000
        94771.60100
       115094.40000
       141094.80000
       174100.00000
       215437.20000
       266433.60000
       328416.40000
       402712.80000
       490650.00000
       593555.20000
       712755.61000
       849578.41000
MINIMUM AVERAGE COST DEPTH
              5583. feet
MINIMUM MARGINAL COST DEPTH
              3722. feet
MARGINAL COST
            15.71360
            12.76440
            11.14240
            10.84760
            11.88000
            14.23960
            17.92640
            22.94040
            29.28160
            36.95000
            45.94560
            56.26840
            67.91840
            80.89560
            95.20000
           110.83160
           127.79040
           146.07640
POINT OF INFLECTION
        73110.48900
MINIMUM AVERAGE COST
            13.09477
MINIMUM MARGINAL COST
            10.79636
```

Table 18

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN SOUTH LOUISIANA

$$\hat{Y} = 14.30 - 0.26(10^{-2})X_1 + 0.23(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	767.	588289.	11.3500	12.4427	-1.0927
2	1872.	3504384.	9.6400	10.2058	-0.5658
3	3018.	9108324.	10.3500	8.4712	1.8788
4	4288.	18386944.	7.4000	7.2453	0.1547
5	6187.	38278969.	7.1800	6.7778	0.4022
6	8750.	76562500.	9.1500	8.7421	0.4079
7	11611.	167407660.	13.0500	14.4562	-1.4062
8	13550.	191801250.	19.6700	20.4410	-0.7710
9	16411.	267330230.	33.3800	32.3880	0.9920

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.14321256E 02	0.10611146E 01	0.13496427E 02	0.09999999E 01	0.
-0.26232614E-02	0.32528242E-03	-0.80645654E 01	0.73837777E 04	0.77349409E 00
0.22693018E-06	0.18878084E-07	0.12020827E 02	0.81574238E 08	0.90021742E 00

```
     RSQ =     0.9840
       R =     0.9920
F( 2,  6)=   184.3259
  SUMUSQ =     8.9522
DURBIN-W.=     1.7974
```

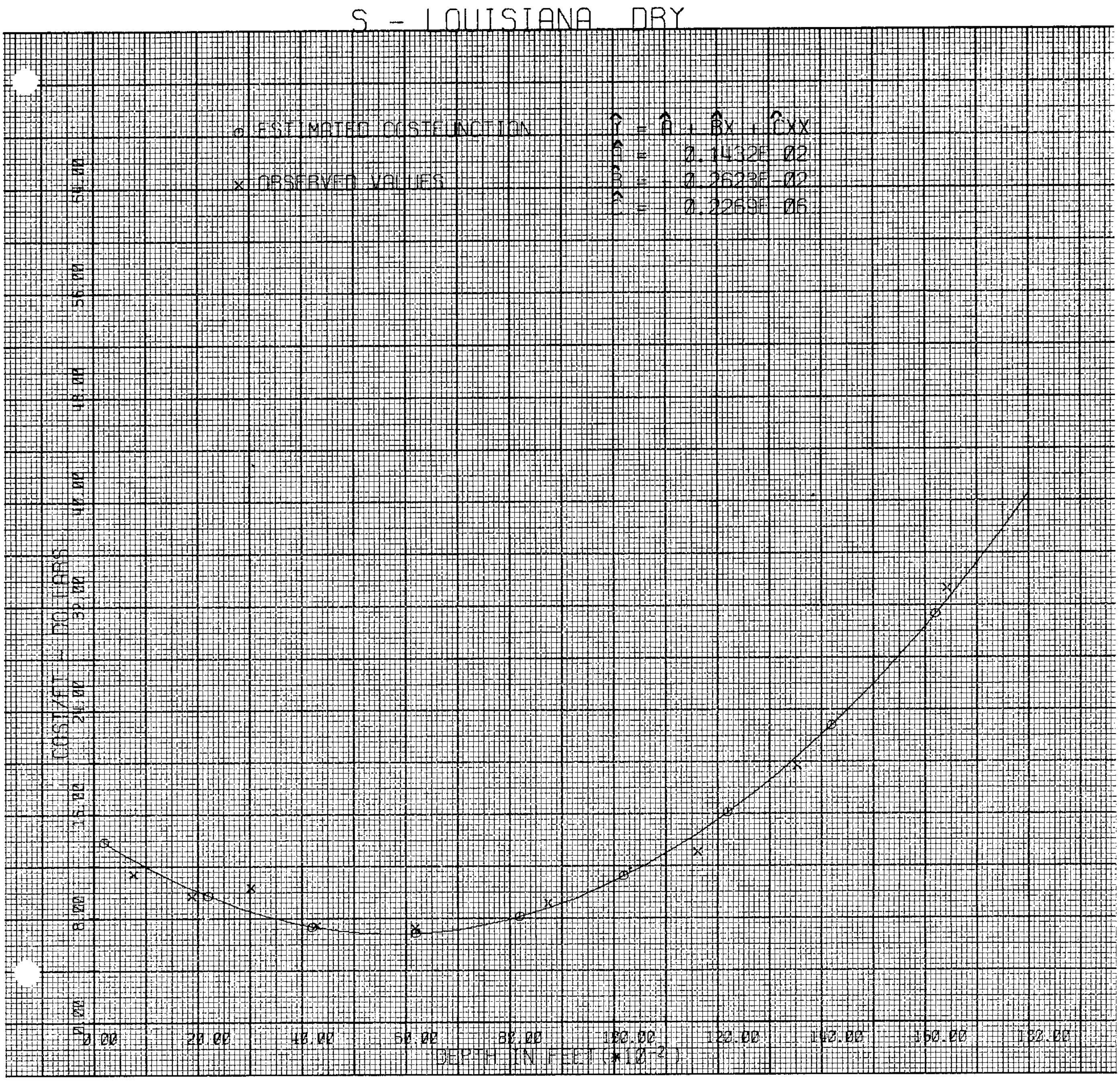

S - LOUISIANA DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1432E 02
B̂ = -0.2623E-02
Ĉ = 0.2269E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10⁻²)

Table 18 a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN SOUTH LOUISIANA

(in dollars)

```
 DEPTH
  18000. feet
TOTAL COST
        11923.90000
        19963.20000
        25479.30000
        29833.60000
        34387.50000
        40502.40100
        49539.70100
        62860.80100
        81827.10200
       107800.00000
       142140.90000
       186211.20000
       241372.30000
       308985.60000
       390412.50000
       487014.41000
       600152.70000
       731188.82000
MINIMUM AVERAGE COST DEPTH
               5780.feet
MINIMUM MARGINAL COST DEPTH
               3853. feet
MARGINAL COST
             9.75470
             6.55080
             4.70830
             4.22720
             5.10750
             7.34920
            10.95230
            15.91680
            22.24270
            29.93000
            38.97870
            49.38880
            61.16030
            74.29320
            88.78750
           104.64320
           121.86030
           140.43880
POINT OF INFLECTION
        38954.41700
MINIMUM AVERAGE COST
             6.73943
MINIMUM MARGINAL COST
             4.21257
```

Table 19

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN MICHIGAN

$$\hat{Y} = 9 - 0.23(10^{-2})X_1 + 0.44(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	830.	688900.	7.0500	7.3901	-0.3401
2	1829.	3345241.	6.5500	6.2708	0.2792
3	3069.	9418761.	6.5200	6.1010	0.4190
4	4338.	18818244.	7.1600	7.3256	-0.1656
5	6157.	37908649.	11.2000	11.5482	-0.3482
6	8657.	74943649.	22.2500	22.0943	0.1557

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.89867935E 01	0.53324708E 00	0.16852963E 02	0.09999999E 01	0.
-0.22882996E-02	0.27413914E-03	-0.83472192E 01	0.41466666E 04	0.87588058E 00
0.43922728E-06	0.28082716E-07	0.15640483E 02	0.24187240E 08	0.96522795E 00

```
     RSQ =     0.9972
       R =     0.9986
F( 2,  3)=   530.2631
   SUMUSQ =    0.5421
DURBIN-W.=     1.9039
```

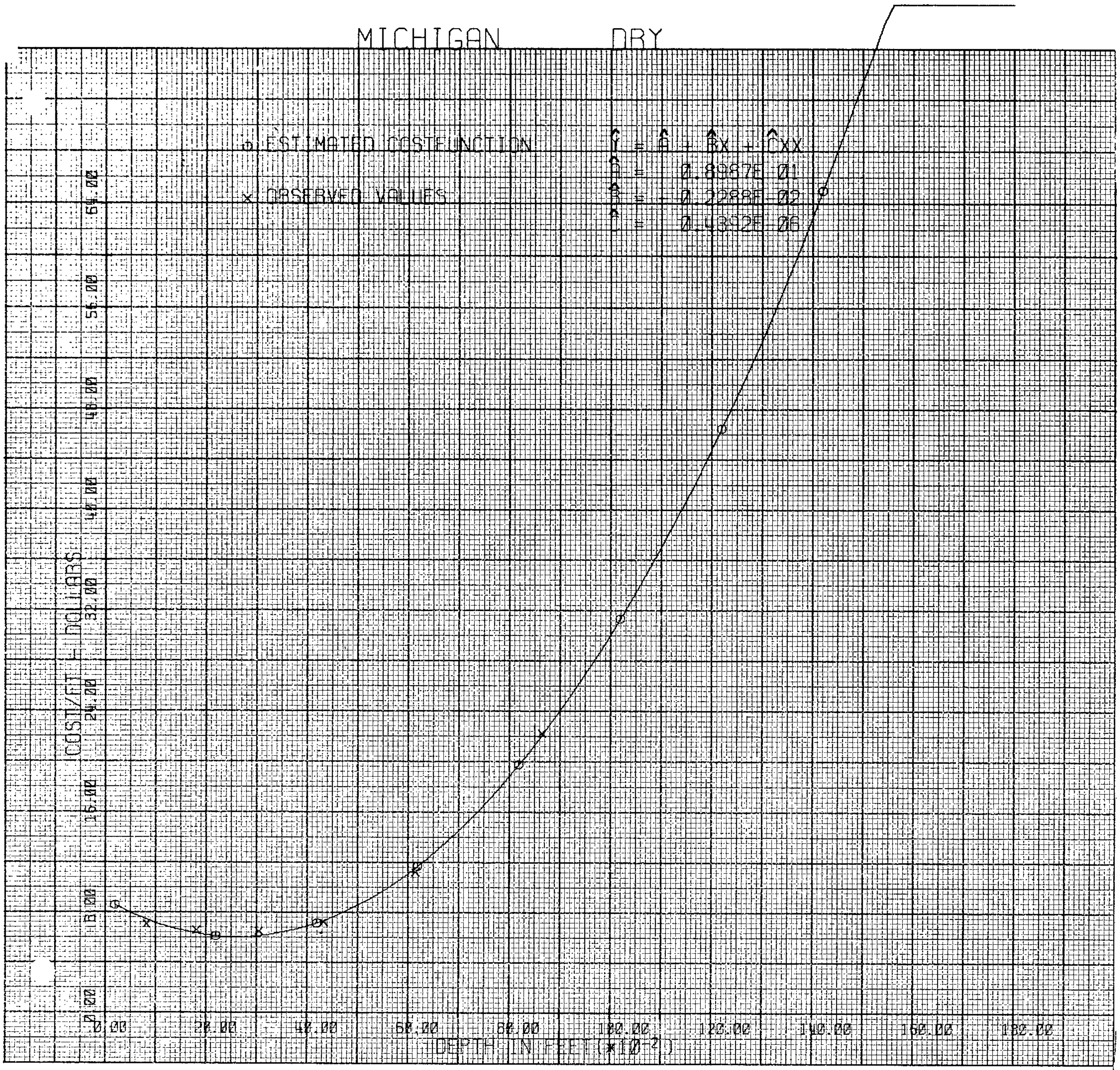

MICHIGAN DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET(*10⁻²)

Table 19a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN MICHIGAN

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
           7138.20000
          12335.60000
          18227.40000
          27448.80000
          42635.00100
          66421.20100
         101442.60000
         150334.40000
         215731.80000
         300270.01000
         406584.20000
         537309.61000
         695081.41000
         882534.81000
        1102305.00000
        1357027.20000
        1649336.60000
        1981868.40000
MINIMUM AVERAGE COST DEPTH
                2605. feet
MINIMUM MARGINAL COST DEPTH
                1736. feet
MARGINAL COST
              5.72860
              5.10540
              7.11740
             11.76460
             19.04700
             28.96460
             41.51740
             56.70540
             74.52860
             94.98700
            118.08060
            143.80940
            172.17340
            203.17260
            236.80700
            273.07660
            311.98140
            353.52140
POINT OF INFLECTION
         15647.12300
MINIMUM AVERAGE COST
              6.00718
MINIMUM MARGINAL COST
              5.01391
```

Table 20

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN MISSISSIPPI

$\hat{Y} = 20 - 0.31(10^{-2})X_1 + 0.21(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	4632.	21455424.	9.3300	9.9412	-0.6112
2	6754.	45616516.	8.7700	8.4047	0.3653
3	9034.	81613156.	10.0100	8.8991	1.1109
4	11557.	133564249.	12.0300	12.0362	-0.0062
5	14345.	162889512.	16.4200	18.6677	-2.2477
6	16303.	232893904.	26.7000	25.3112	1.3888

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19981811E 02	0.52512776E 01	0.38051333E 01	0.09999999E 01	0.
-0.31577088E-02	0.11098828E-02	-0.28450829E 01	0.10437500E 05	0.86967392E 00
0.21374012E-06	0.52177312E-07	0.40964187E 01	0.12563603E 09	0.92915692E 00

RSQ =	0.9630
R =	0.9813
F(2, 3)=	39.0895
SUMUSQ =	8.7221
DURBIN-W.=	2.4084

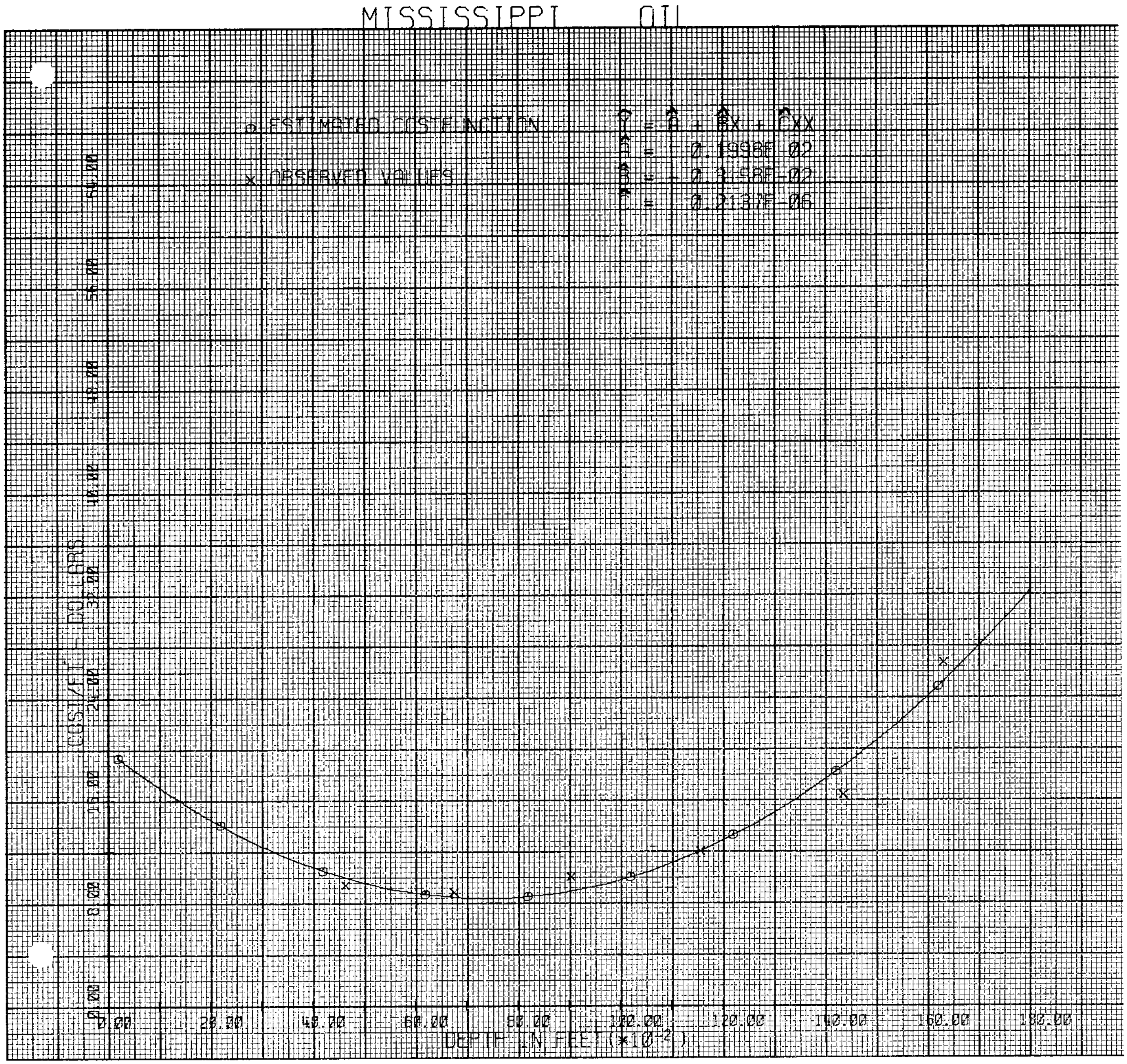

MISSISSIPPI OIL
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Y = A + BX + CXX
A = 0.1998E 02
C = 0.2137E-06
COST/FT - DOLLARS
56.00
48.00
40.00
32.00
24.00
16.00
8.00
0.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10^-2)

Table 20a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN MISSISSIPPI

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
        17035.70000
        29037.60000
        37287.90000
        43068.80000
        47662.50000
        52351.20000
        58417.10000
        67142.40100
        79809.30100
        97700.00000
       122096.70000
       154281.60000
       195536.90000
       247144.80000
       310387.50000
       386547.20000
       476906.11000
       582746.41000
MINIMUM AVERAGE COST DEPTH
              7389. feet
MINIMUM MARGINAL COST DEPTH
              4926. feet
MARGINAL COST
           14.30510
            9.91240
            6.80190
            4.97360
            4.42750
            5.16360
            7.18190
           10.48240
           15.06510
           20.93000
           28.07710
           36.50640
           46.21790
           57.21160
           69.48750
           83.04560
           97.88590
          114.00840
POINT OF INFLECTION
        61423.51000
MINIMUM AVERAGE COST
            8.31299
MINIMUM MARGINAL COST
            4.42398
```

Table 21

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN MISSISSIPPI

$$\hat{Y} = 15.80 - 0.30(10^{-2})X_1 + 0.25(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	2789.	7778521.	8.6000	9.3148	-0.7148
2	4830.	23328900.	7.4500	7.0182	0.4318
3	5310.	28196100.	7.2600	6.7795	0.4805
4	8057.	64915249.	7.9500	7.6222	0.3278
5	10786.	116337796.	12.3000	12.1825	0.1175
6	13590.	192344050.	19.3400	20.7332	-1.3932
7	16500.	268062500.	34.5000	33.7496	0.7504

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.15809097E 02	0.16335370E 01	0.96778321E 01	0.09999999E 01	0.
-0.30233748E-02	0.40200010E-03	-0.75208309E 01	0.88374285E 04	0.88199981E 00
0.24913208E-06	0.20519195E-07	0.12141415E 02	0.99642094E 08	0.95455401E 00

```
      RSQ =    0.9941
        R =    0.9971
F( 2,   4)=  338.9050
   SUMUSQ =    3.5535
DURBIN-W.=    2.3249
```

MISSISSIPPI GAS

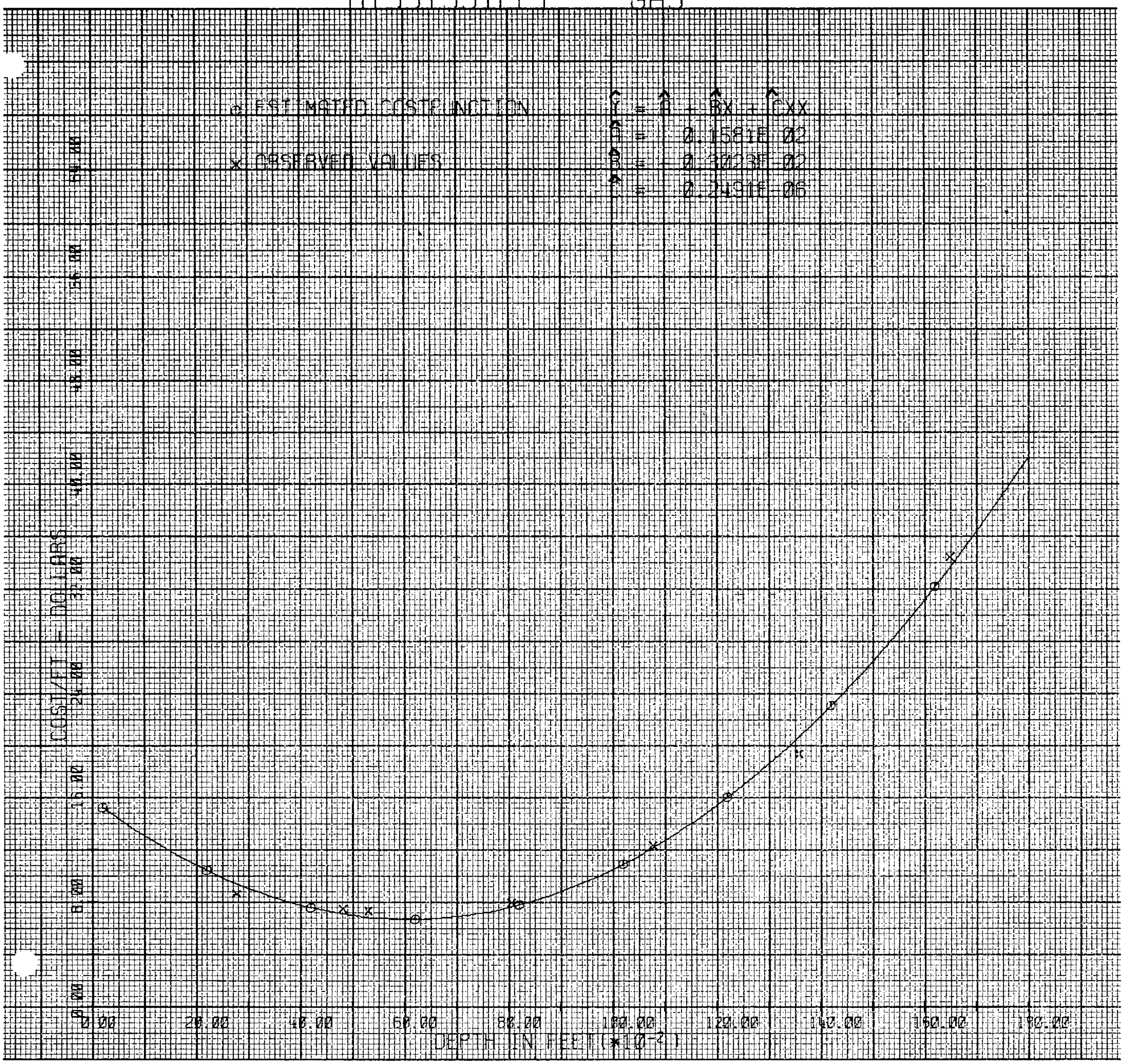


Table 21a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN MISSISSIPPI

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          13036.10000
          21520.80000
          26948.70000
          30814.40000
          34612.50000
          39837.59900
          47984.29800
          60547.19900
          79020.89900
         104900.00000
         139679.10000
         184852.80000
         241915.70000
         312362.39000
         397687.49000
         499385.60000
         618951.31000
         757879.19000
MINIMUM AVERAGE COST DEPTH
                 6068.feet
MINIMUM MARGINAL COST DEPTH
                 4045. feet
MARGINAL COST
              10.51130
               6.70720
               4.39770
               3.58280
               4.26250
               6.43680
              10.10570
              15.26920
              21.92730
              30.08000
              39.72730
              50.86920
              63.50570
              77.63680
              93.26250
             110.38280
             128.99770
             149.10720
POINT OF INFLECTION
         40281.10200
MINIMUM AVERAGE COST
               6.63845
MINIMUM MARGINAL COST
               3.58127
```

Table 22

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN MISSISSIPPI

$\hat{Y} = 9.16 - 0.73(10^{-2})X_1 + 0.11(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

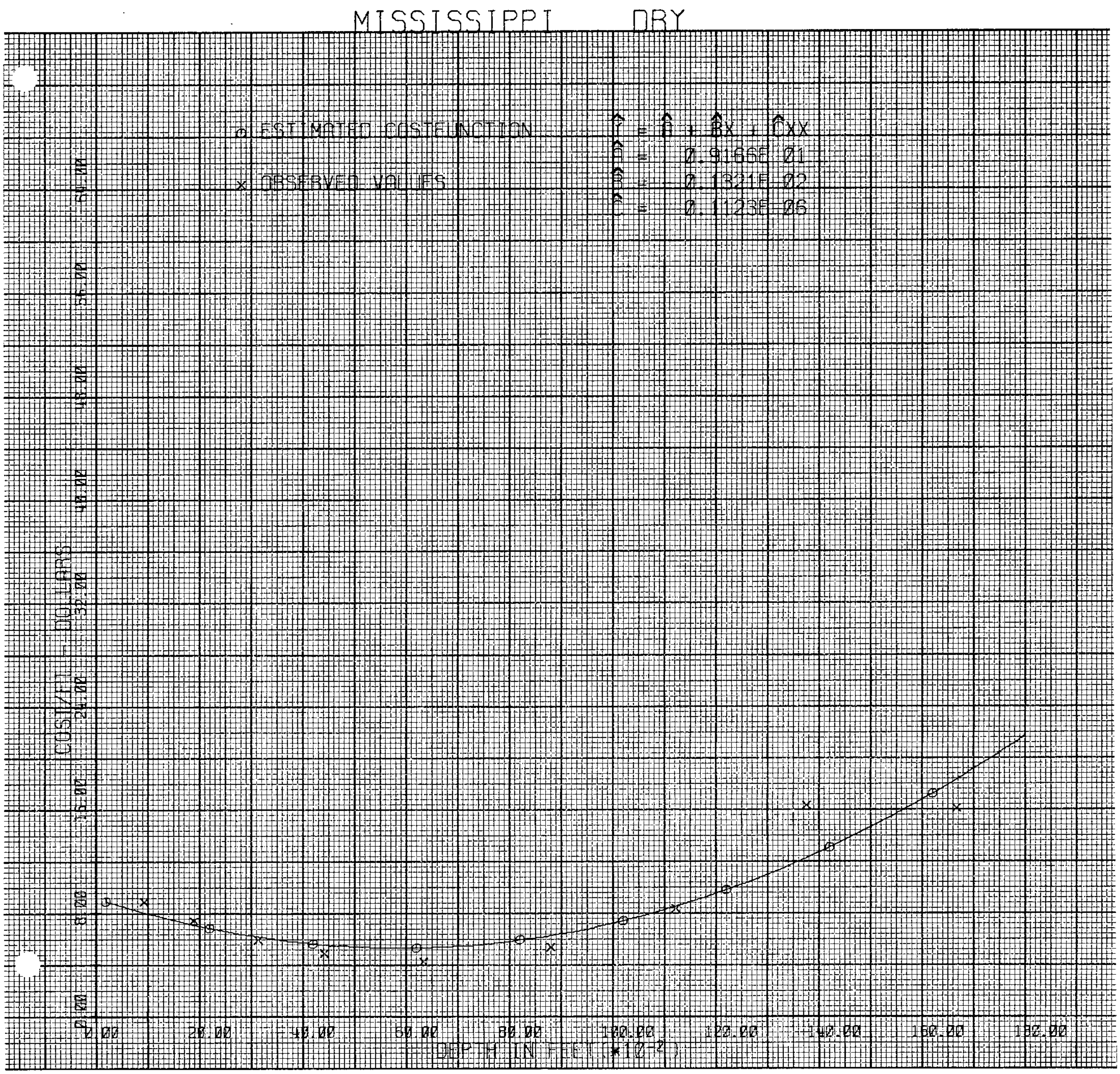
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	933.	870489.	8.8500	8.0306	0.8194
2	1899.	3606201.	7.4000	7.0613	0.3387
3	3149.	9916201.	5.9000	6.1180	-0.2180
4	4411.	19456921.	4.8700	5.5216	-0.6516
5	6331.	40081561.	4.2200	5.3001	-1.0801
6	8798.	77404804.	5.3700	6.2307	-0.8607
7	11226.	126023076.	8.3200	8.4808	-0.1608
8	13763.	194710084.	16.3300	12.2462	4.0838
9	16663.	269413892.	16.0500	18.3206	-2.2706

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.91657085E 01	0.18142848E 01	0.50519677E 01	0.09999999E 01	0.
-0.13213772E-02	0.53833065E-03	-0.24545828E 01	0.74636666E 04	0.71780948E 00
0.11227234E-06	0.30572493E-07	0.36723319E 01	0.82714998E 08	0.83717223E 00

```
      RSQ =    0.8507
        R =    0.9224
 F( 2,  6)=   17.0991
   SUMUSQ =   25.0244
DURBIN-W.=    2.3915
```



MISSISSIPPI DRY
ESTIMATED COSTFUNCTION
OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.9166E Ø1
B̂ = -Ø.1321E Ø2
Ĉ = Ø.1123E Ø6
COST/FT - DOLLARS
DEPTH IN FEET (*10⁻²)
Ø.ØØ
8.ØØ
16.ØØ
24.ØØ
32.ØØ
4Ø.ØØ
48.ØØ
56.ØØ
64.ØØ
2Ø.ØØ
4Ø.ØØ
6Ø.ØØ
8Ø.ØØ
1ØØ.ØØ
12Ø.ØØ
14Ø.ØØ
16Ø.ØØ
18Ø.ØØ

Table 22a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN MISSISSIPPI
(in dollars)

DEPTH
18000. feet
TOTAL COST
7957.30000
13946.40000
18641.10000
22715.20000
26842.50000
31696.80000
37951.89900
46281.59900
57359.69900
71859.99900
90456.29900
113822.40000
142632.10000
177559.20000
219277.50000
268460.80000
325782.90000
391917.60000
MINIMUM AVERAGE COST DEPTH
5882. feet
MINIMUM MARGINAL COST DEPTH
3921. feet
MARGINAL COST
6.86090
5.22960
4.27210
3.98840
4.37850
5.44240
7.18010
9.59160
12.67690
16.43600
20.86890
25.97560
31.75610
38.21040
45.33850
53.14040
61.61610
70.76560
POINT OF INFLECTION
31061.87900
MINIMUM AVERAGE COST
5.28122
MINIMUM MARGINAL COST
3.98630

Table 23

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN MONTANA

$\hat{Y} = 13.60 - 0.14(10^{-2})X_1 + 0.16(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	2021.	4084441.	11.8800	11.3876	0.4924
2	2946.	8678916.	10.5100	10.8083	-0.2983
3	4727.	22344529.	9.6700	10.4568	-0.7868
4	6475.	41925625.	11.5700	11.0897	0.4803
5	8738.	76352644.	13.5800	13.3479	0.2321
6	12836.	182381448.	21.4500	21.5695	-0.1195

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
			0.09999999E 01	0.
0.13597228E 02	0.10186199E 01	0.13348676E 02	0.62904999E 04	0.86654340E 00
-0.14136806E-02	0.33179527E-03	-0.42607014E 01	0.53024841E 08	0.95105937E 00
0.15852043E-06	0.21943840E-07	0.72239147E 01		

RSQ = 0.9865
R = 0.9932
F(2, 3)= 109.2674
SUMUSQ = 1.2493
DURBIN-W.= 2.1249

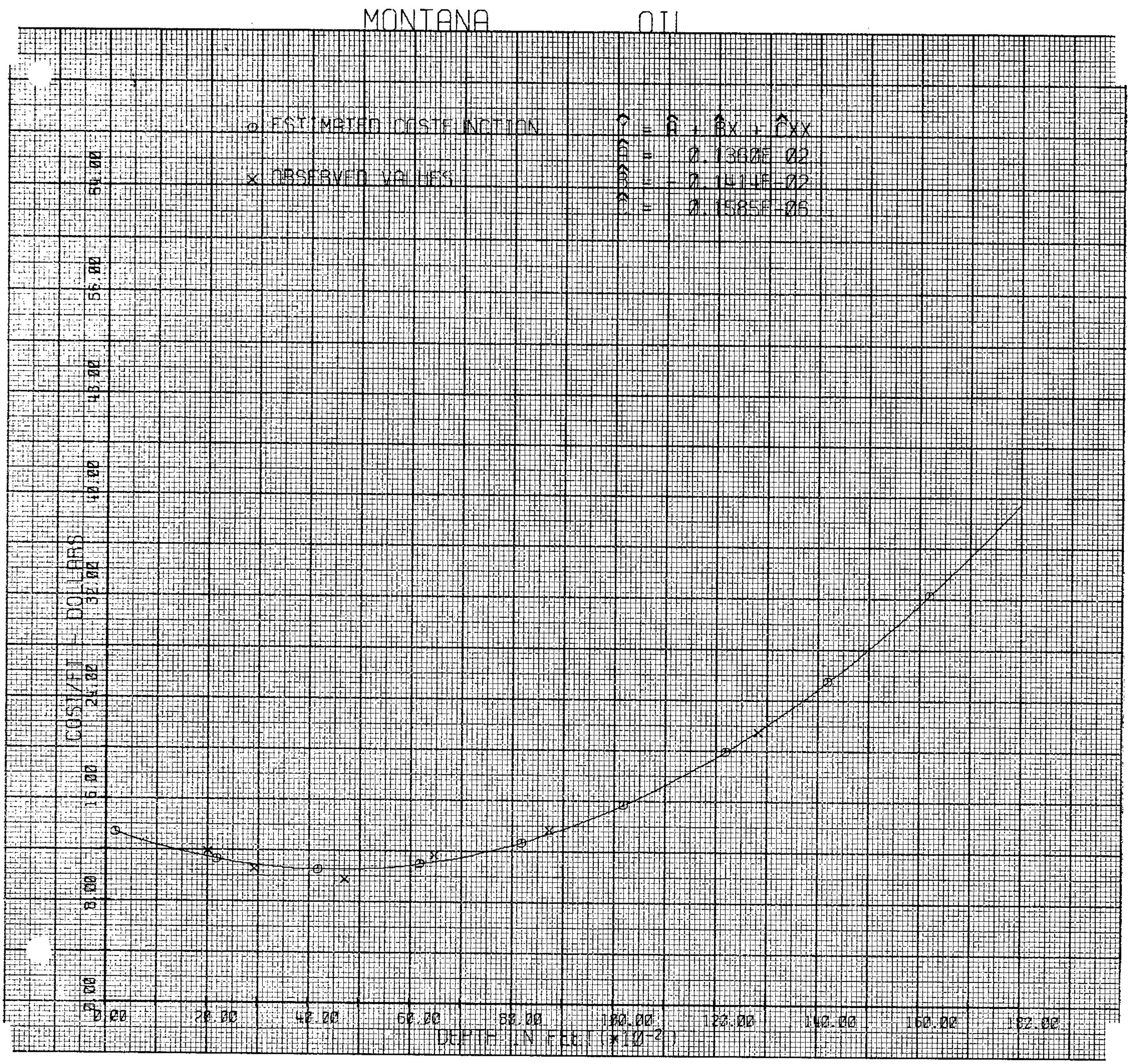

MONTANA OIL
⊙ ESTIMATED COST FUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1360E 02
B̂ = -0.1414E-02
Ĉ = 0.1585E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
182.00
DEPTH IN FEET (*10^-2)

Table 23a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN MONTANA

(in dollars)

DEPTH
18000.feet
TOTAL COST
12344.50000
22812.00000
32353.50000
41920.00000
52462.50000
64932.00100
80279.50100
99456.00100
123412.50000
153100.00000
189469.50000
233472.00000
286058.50000
348180.00000
420787.51000
504832.01000
601264.51000
711036.02000
MINIMUM AVERAGE COST DEPTH
4461. feet
MINIMUM MARGINAL COST DEPTH
2974. feet
MARGINAL COST
11.24750
9.84600
9.39550
9.89600
11.34750
13.75000
17.10350
21.40800
26.66350
32.87000
40.02750
48.13600
57.19550
67.20600
78.16750
90.08000
102.94350
116.75800
POINT OF INFLECTION
46596.78000
MINIMUM AVERAGE COST
10.44638
MINIMUM MARGINAL COST
9.39517

Table 24

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN MONTANA

$$\hat{Y} = 11.40 - 0.22(10^{-2})X_1 + 0.24(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	817.	667489.	10.7900	9.7501	1.0399
2	2063.	4255969.	7.0100	7.8935	-0.8835
3	2915.	8497225.	5.9800	7.0476	-1.0676
4	4439.	19704721.	6.5400	6.3930	0.1470
5	6010.	36120100.	7.7200	6.8706	0.8494
6	8533.	72812089.	10.7400	10.0862	0.6538
7	10815.	116964225.	14.4500	15.5937	-1.1437
8	12648.	179985952.	22.2100	21.8054	0.4046

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.11367012E 02	0.10909040E 01	0.10419808E 02	0.09999999E 01	0.
-0.21727429E-02	0.41103370E-03	-0.52860457E 01	0.60300000E 04	0.79376312E 00
0.23703717E-06	0.29775370E-07	0.79608471E 01	0.52374215E 08	0.90651380E 00

RSQ =	0.9729
R =	0.9864
F(2, 5)=	89.9137
SUMUSQ =	5.6439
DURBIN-W.=	2.0142

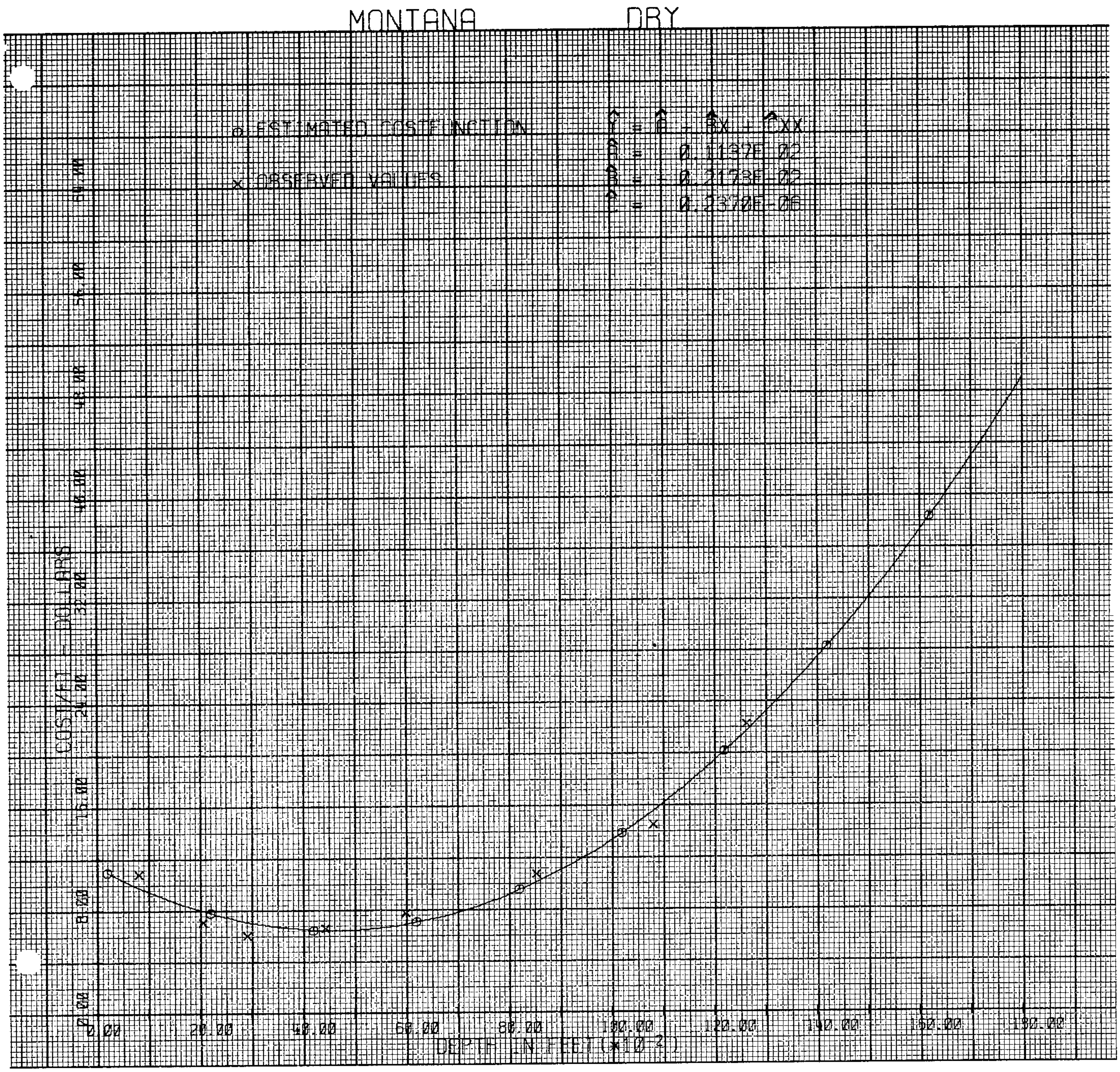

MONTANA DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Y = A + BX + CXX
A = 0.1137E 02
B = -0.2173E-02
C = 0.2370E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (x10^2)

Table 24a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN MONTANA

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          9433.99990
         15944.00000
         20952.00000
         25880.00000
         32150.00100
         41184.00100
         54404.00100
         73232.00000
         99090.00200
        133400.00000
        177584.00000
        233064.00000
        301262.00000
        383600.01000
        481500.01000
        596384.00000
        729674.01000
        882792.01000
MINIMUM AVERAGE COST DEPTH
                4584. feet
MINIMUM MARGINAL COST DEPTH
                3056. feet
MARGINAL COST
             7.73500
             5.52200
             4.73100
             5.36200
             7.41500
            10.89000
            15.78700
            22.10600
            29.84700
            39.01000
            49.59500
            61.60200
            75.03100
            89.88200
           106.15500
           123.85000
           142.96700
           163.50600
POINT OF INFLECTION
         29289.94200
MINIMUM AVERAGE COST
             6.38906
MINIMUM MARGINAL COST
             4.72875
```

Table 25

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN EAST NEW MEXICO

$$\hat{Y} = 20 - 0.26(10^{-2})X_1 + 0.20(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	839.	703921.	19.2800	17.8047	1.4753
2	1958.	3833764.	15.2800	15.5295	-0.2495
3	3267.	10673289.	12.4700	13.4976	-1.0276
4	4446.	19766916.	10.2600	12.2486	-1.9886
5	6509.	42367081.	12.2000	11.3882	0.8118
6	9047.	81848209.	13.8600	12.6429	1.2171
7	11324.	128232976.	16.6900	15.9406	0.7494
8	13495.	191057512.	20.0100	20.9979	-0.9879

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19835980E 02	0.14740152E 01	0.13457106E 02	0.09999999E 01	0.
-0.25873333E-02	0.52562203E-03	-0.49224216E 01	0.63606250E 04	0.29467937E-00
0.19810522E-06	0.36019492E-07	0.54999449E 01	0.58692648E 08	0.49271436E-00

RSQ =	0.8705
R =	0.9330
F(2, 5)=	16.8007
SUMUSQ =	10.9272
DURBIN-W.=	1.4411

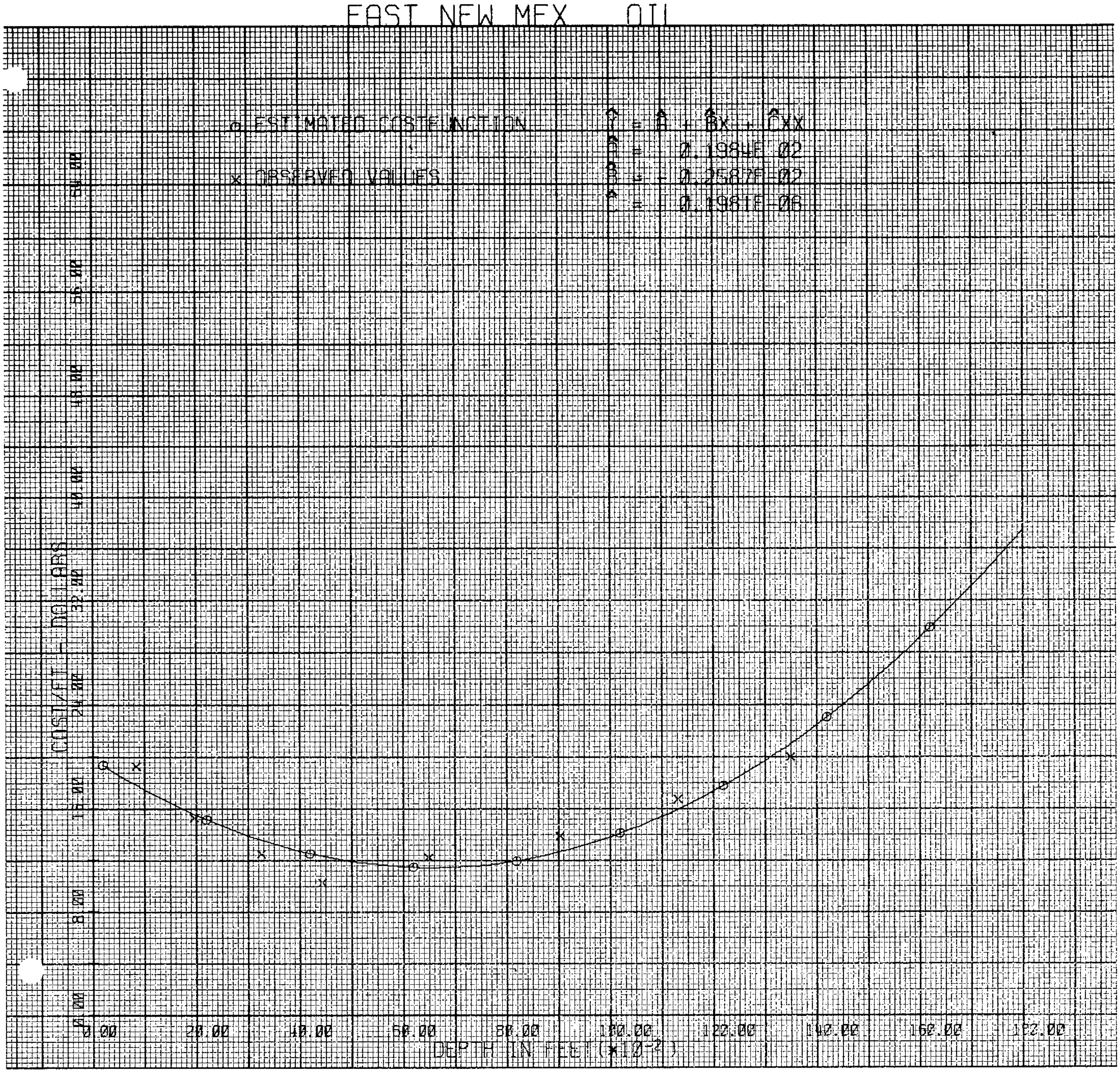

EAST NEW MEX OIL
o ESTIMATED COST FUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1984E 02
B̂ = -0.2587E-02
Ĉ = 0.1981E-06
COST/FT - DOLLARS
DEPTH IN FEET (x10^-2)

Table 25a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN EAST NEW MEXICO

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          17451.10000
          30916.80000
          41585.70000
          50646.40000
          59287.50000
          68697.59900
          80065.30000
          94579.20000
         113427.90000
         137800.00000
         168884.10000
         207868.80000
         255942.70000
         314294.40000
         384112.50000
         466585.60000
         562902.31000
         674251.21000
MINIMUM AVERAGE COST DEPTH
                 6530.feet
MINIMUM MARGINAL COST DEPTH
                 4353. feet
MARGINAL COST
              15.26030
              11.86920
               9.66670
               8.65280
               8.82750
              10.19080
              12.74270
              16.48320
              21.41230
              27.53000
              34.83630
              43.33120
              53.01470
              63.88680
              75.94750
              89.19680
             103.63470
             119.26120
POINT OF INFLECTION
         74397.81100
MINIMUM AVERAGE COST
              11.39405
MINIMUM MARGINAL COST
               8.57874
```

Table 26

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN EAST NEW MEXICO

$$\hat{Y} = 17.90 - 0.18(10^{-2})X_1 + 0.20(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1794.	3218436.	17.7500	15.3505	2.3995
2	3044.	9265936.	13.2000	14.3439	-1.1439
3	4294.	18438436.	11.4000	13.9743	-2.5743
4	6003.	36036009.	13.5800	14.4999	-0.9199
5	8346.	69655716.	19.5200	17.1560	2.3640
6	11427.	130576329.	24.9000	24.0556	0.8444
7	14050.	198701250.	32.0100	32.9797	-0.9697

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.17908543E 02	0.32559638E 01	0.55002276E 01	0.09999999E 01	0.
-0.17916169E-02	0.10145777E-02	-0.17658744E 01	0.69940000E 04	0.87080166E 00
0.20386449E-06	0.62919205E-07	0.32400995E 01	0.66370480E 08	0.93879110E 00

RSQ =	0.9333
R =	0.9661
F(2, 4)=	27.9917
SUMUSQ =	21.7808
DURBIN-W.=	1.5483

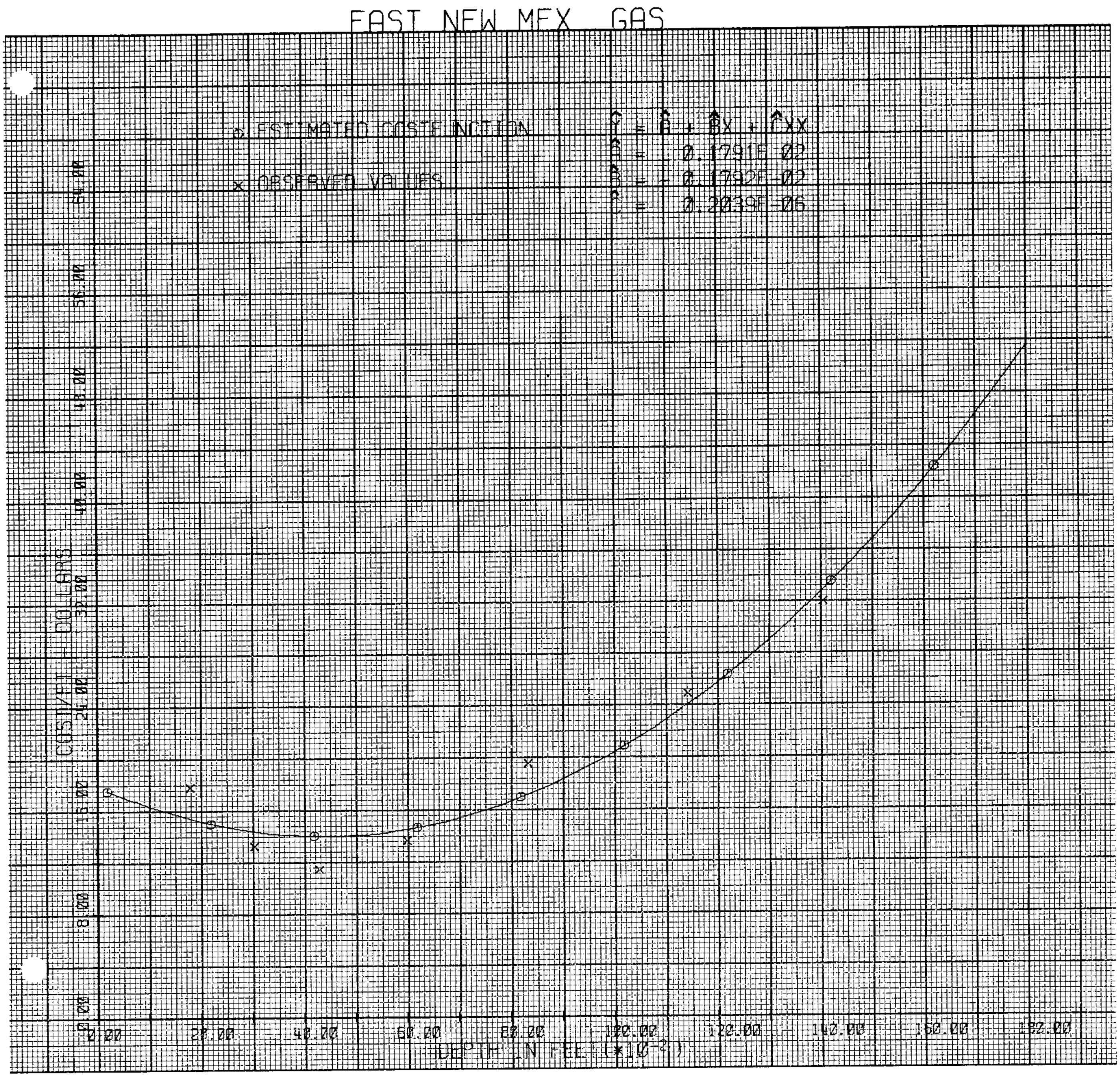

EAST NEW MEX GAS
○ ESTIMATED COST FUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1791E 02
B̂ = - 0.1792E-02
Ĉ = 0.2039E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10^-2)

Table 26a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN EAST NEW MEXICO

(in dollars)

```
    DEPTH
      18000. feet
   TOTAL COST
           16321.90000
           30283.20000
           43107.30100
           56017.60100
           70237.50000
           86990.40200
          107499.70000
          132988.80000
          164681.10000
          203800.00000
          251568.90000
          309211.20000
          377950.30000
          459009.60000
          553612.50000
          662982.40000
          788342.71000
          930916.81000
 MINIMUM AVERAGE COST DEPTH
               4394. feet
 MINIMUM MARGINAL COST DEPTH
               2930. feet
 MARGINAL COST
              14.93770
              13.18880
              12.66330
              13.36120
              15.28250
              18.42720
              22.79530
              28.38680
              35.20170
              43.24000
              52.50170
              62.98680
              74.69530
              87.62720
             101.78250
             117.16120
             133.76330
             151.58880
POINT OF INFLECTION
          61400.37700
MINIMUM AVERAGE COST
              13.97270
MINIMUM MARGINAL COST
              12.66026
```

Table 27

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN EAST NEW MEXICO

$\hat{Y} = 15.90 - 0.22(10^{-2})X_1 + 0.20$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	811.	657721.	14.0200	14.1973	-0.1773
2	1694.	2869636.	11.4100	12.6699	-1.2599
3	3086.	9523396.	11.0600	10.8939	0.1661
4	4309.	18567481.	10.0200	9.9716	0.0484
5	6069.	36832761.	12.6400	9.6921	2.9479
6	8815.	77704225.	11.9100	11.7249	0.1851
7	11075.	122655625.	14.5200	15.6555	-1.1355
8	13603.	192520804.	20.4200	22.4675	-2.0475
9	17649.	277871800.	39.9500	38.6773	1.2727

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.15874351E 02	0.14125227E 01	0.11238297E 02	0.09999999E 01	0.
-0.22296798E-02	0.40207100E-03	-0.55454878E 01	0.74567778E 04	0.79669463E 00
0.19954126E-06	0.21927875E-07	0.90998905E 01	0.85037738E 08	0.92132134E 00

```
      RSQ =      0.9753
        R =      0.9876
F( 2,   6)=    118.5623
   SUMUSQ =     17.4744
DURBIN-W.=      1.8804
```

EAST NEW MEX DRY

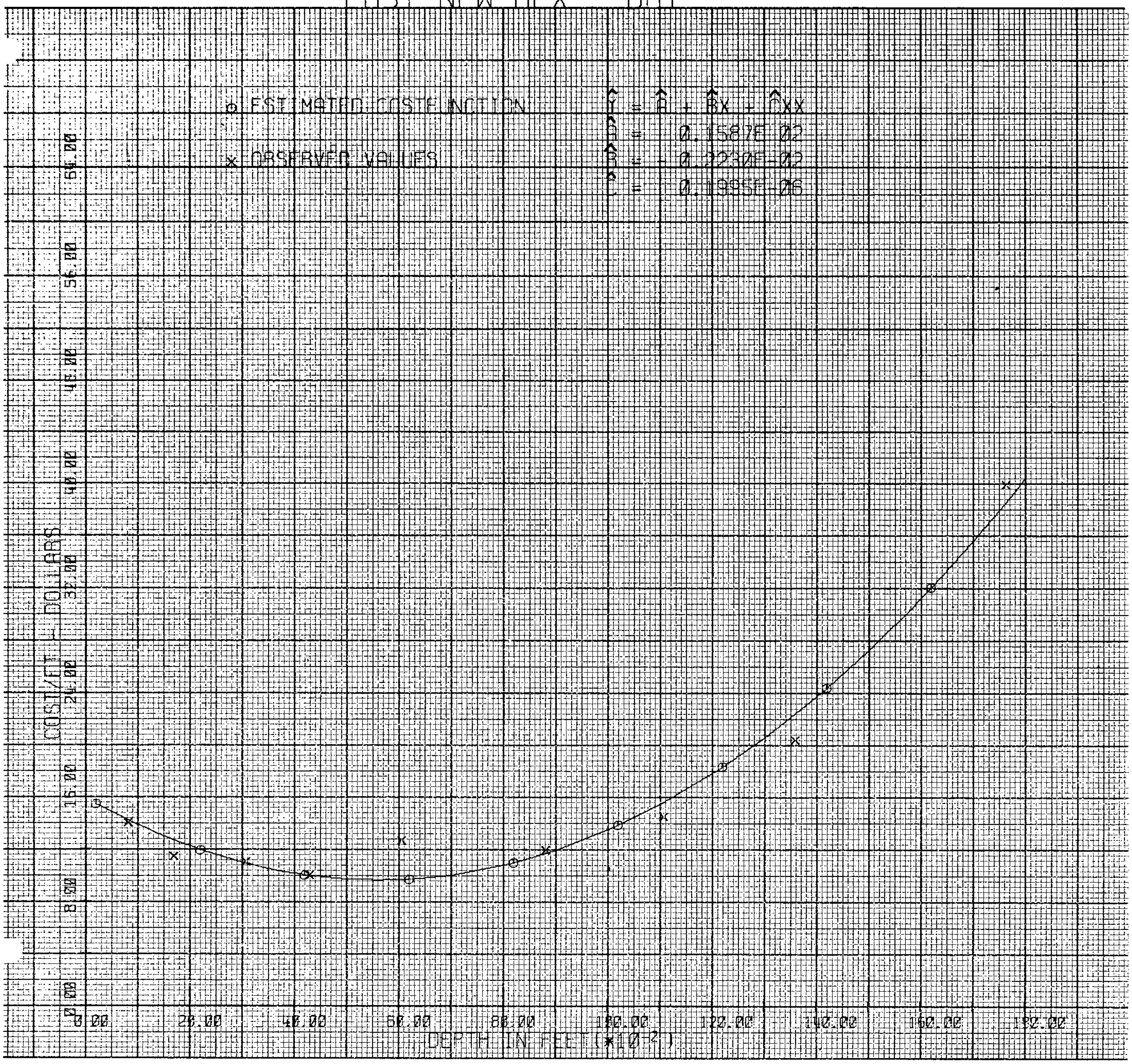


Table 27a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN EAST NEW MEXICO

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
        13839.50000
        24416.00000
        32926.50000
        40568.00000
        48537.50000
        58032.00000
        70248.49900
        86384.00100
       107635.50000
       135200.00000
       170274.50000
       214056.00000
       267741.50000
       332528.00000
       409612.50000
       500192.00000
       605463.51000
       726624.00000
MINIMUM AVERAGE COST DEPTH
           5589. feet
MINIMUM MARGINAL COST DEPTH
           3726. feet
MARGINAL COST
           12.00850
            9.34400
            7.87650
            7.60600
            8.53250
           10.65600
           13.97650
           18.49400
           24.20850
           31.12000
           39.22850
           48.53400
           59.03650
           70.73600
           83.63250
           97.72600
          113.01650
          129.50400
POINT OF INFLECTION
        53868.17000
MINIMUM AVERAGE COST
            9.63830
MINIMUM MARGINAL COST
            7.56106
```

Table 28

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN WEST NEW MEXICO

$\hat{Y} = 10 + 0.10(10^{-2})X$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X = Depth

SAMPLE	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
NUMBER	X	Y	$\hat{Y}$	$Y - \hat{Y}$
1	973.	12.5000	10.9555	1.5445
2	1637.	11.4000	11.6296	-0.2296
3	2510.	10.7000	12.5158	-1.8158
4	6660.	17.1500	16.7285	0.4215
5	7854.	18.0200	17.9406	0.0794

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.99678132E 01	0.10850479E 01	0.91865180E 01	0.09999999E 01	0.
0.10151232E-02	0.22530238E-03	0.45056037E 01	0.39268000E 04	0.93340631E 00

```
      RSQ =    0.8712
        R =    0.9334
F( 1,  3)=   20.3005
   SUMUSQ =    5.9191
DURBIN-W.=    1.8222
```

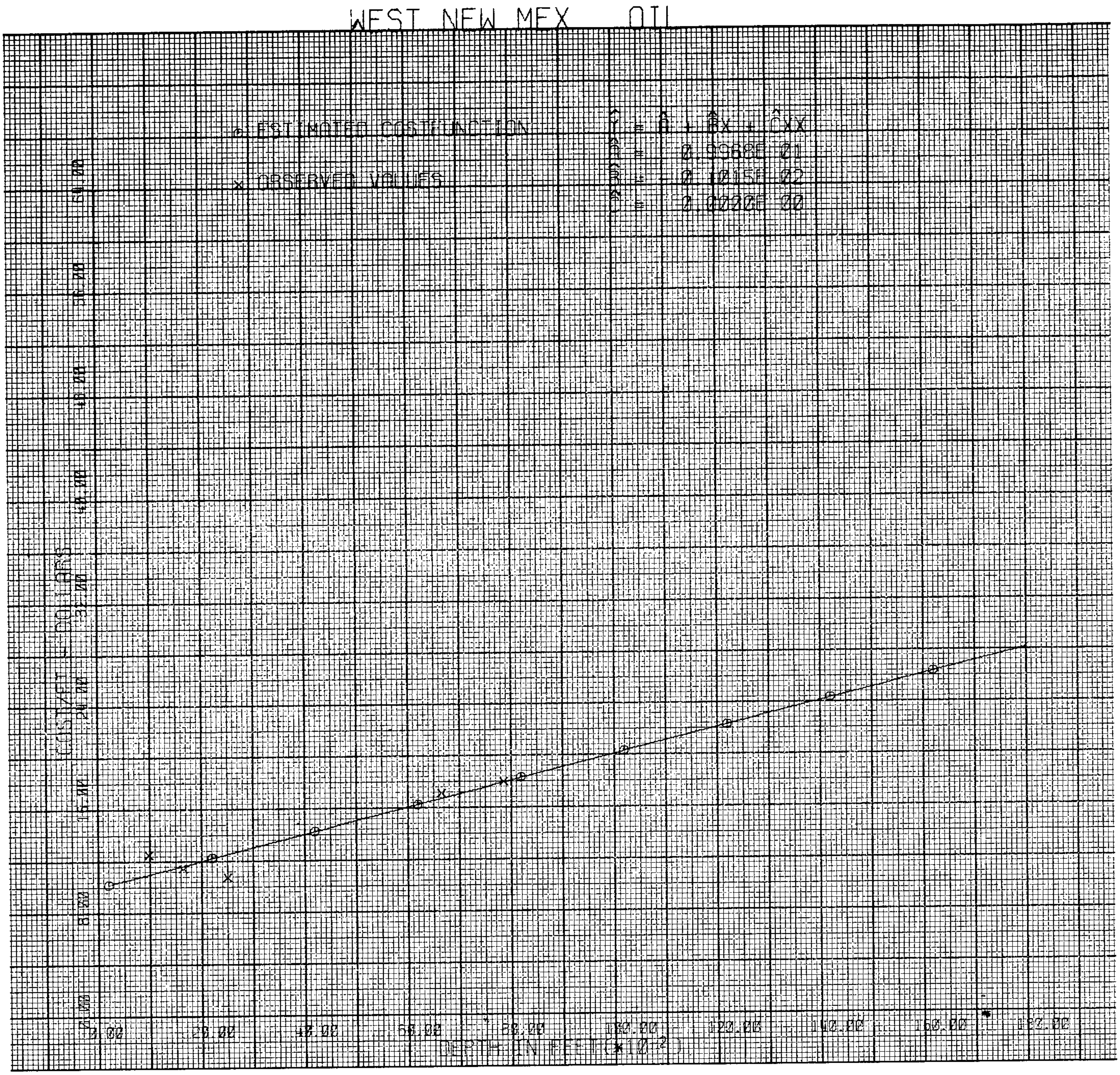

WEST NEW MEX OIL
o ESTIMATED COST FUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.9988E 01
B̂ = 0.1015E 02
Ĉ = 0.0000E 00
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (x10 2)

Table 29

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN WEST NEW MEXICO

$\hat{Y} = 7.50 + 0.82(10^{-3})X_1$

Where:

$\hat{Y}$ = **Estimated drilling cost per foot**

X = **Depth**

SAMPLE NUMBER	OBSERVED VALUES X	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	2299.	10.5900	9.3531	1.2369
2	3066.	9.2500	9.9814	-0.7314
3	4037.	10.0200	10.7767	-0.7567
4	6654.	12.5100	12.9203	-0.4103
5	7836.	14.5500	13.8885	0.6615

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.74700503E 01	0.11460935E 01	0.65178340E 01	0.09999999E 01	0.
0.81909180E-03	0.21922075E-03	0.37363781E 01	0.47783999E 04	0.90725884E 00

```
      RSQ =    0.8231
        R =    0.9073
 F( 1,  3)=   13.9605
   SUMUSQ =    3.2434
DURBIN-W.=    1.5858
```

WEST NEW MEX GAS

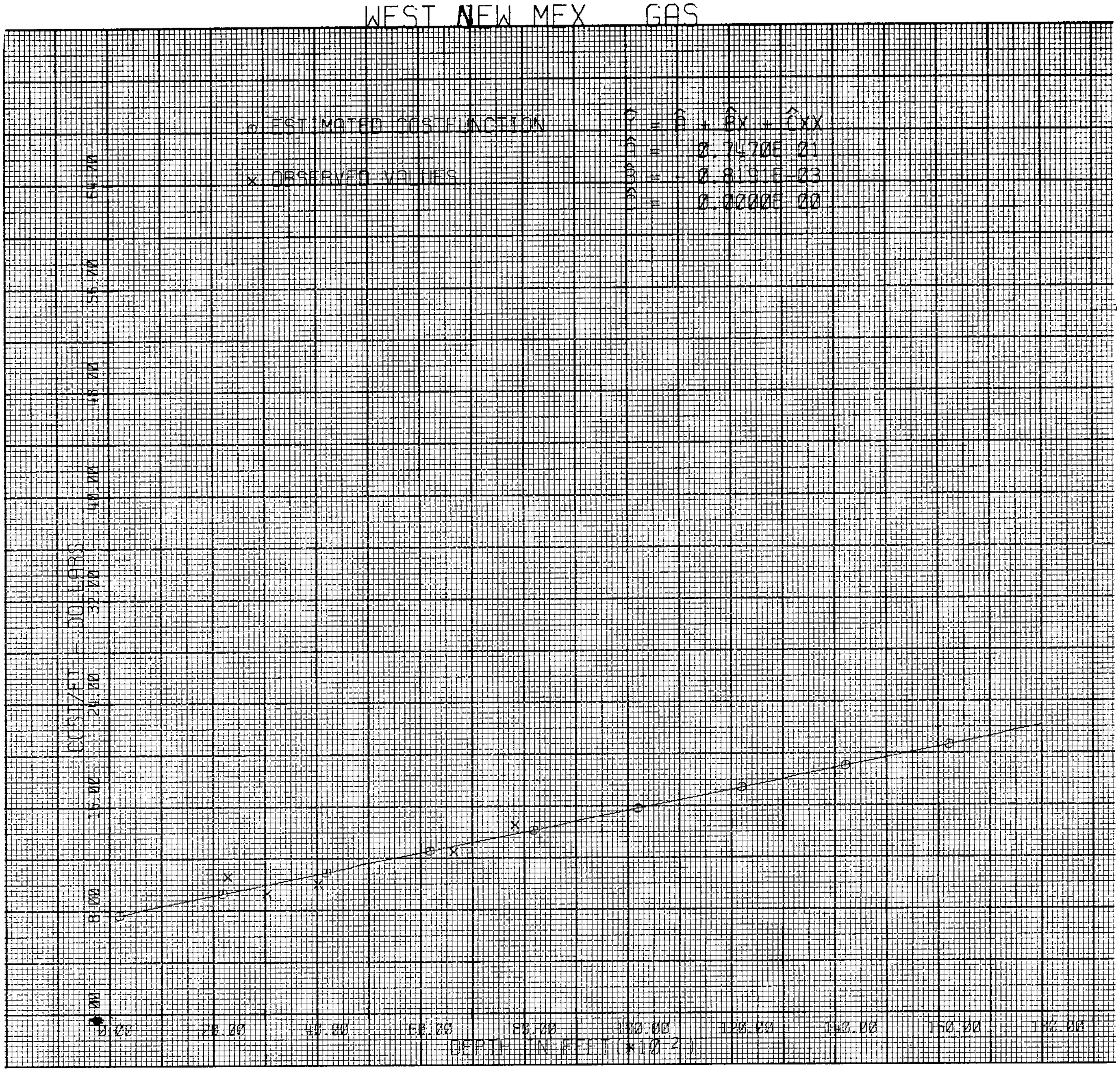


Table 30

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN WEST NEW MEXICO

$$\hat{Y} = 14.50 - 0.36(10^{-2})X_1 + 0.49(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

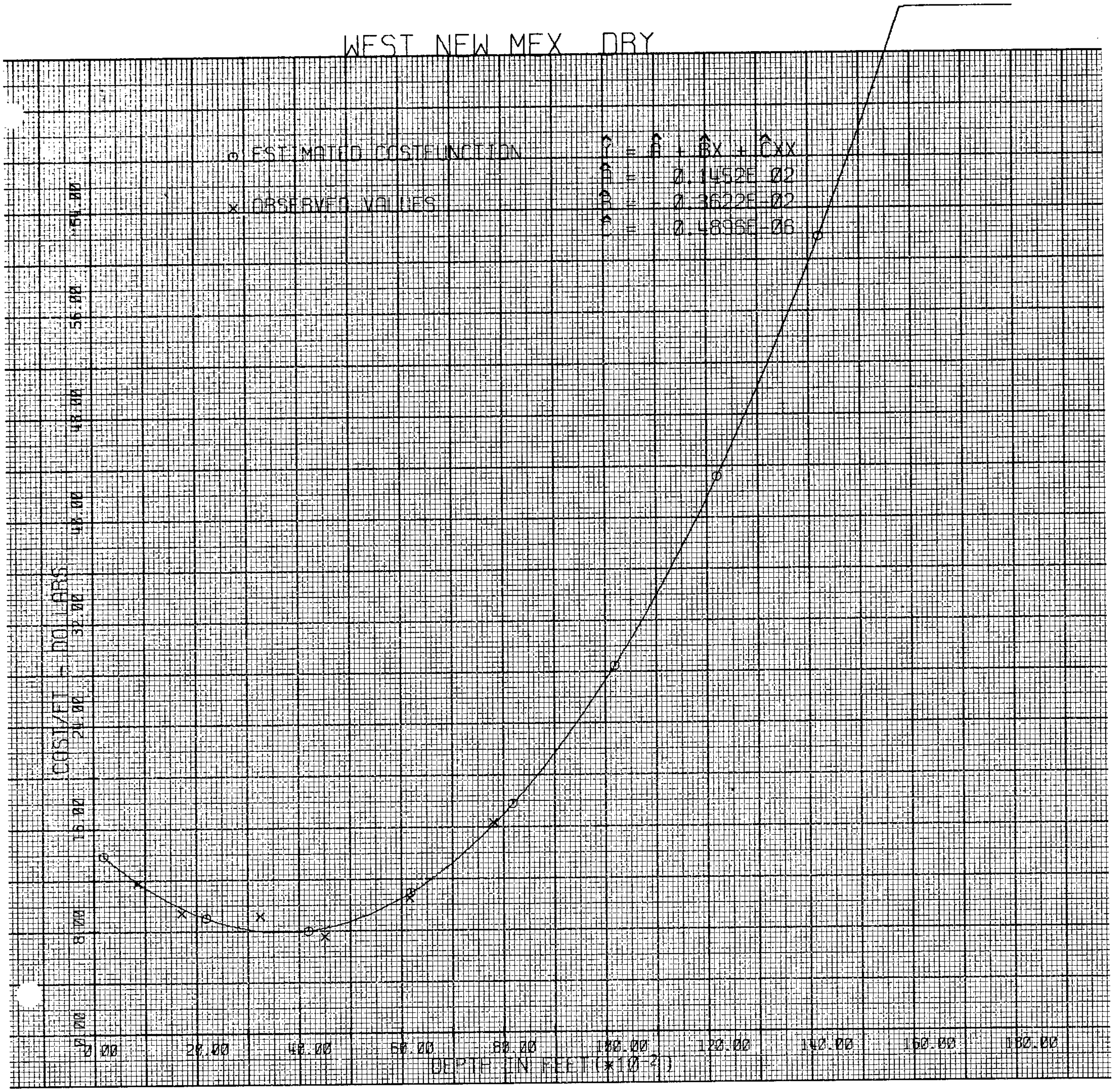
X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	857.	734449.	11.7200	11.7756	-0.0556
2	1711.	2927521.	9.3800	9.7559	-0.3759
3	3260.	10627600.	9.1100	7.9152	1.1948
4	4528.	20502784.	7.5000	8.1574	-0.6574
5	6172.	38093584.	10.4500	10.8155	-0.3655
6	7811.	61011721.	16.3600	16.1003	0.2597

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.14520332E 02	0.11317559E 01	0.12829915E 02	0.09999999E 01	0.
-0.36223447E-02	0.63695540E-03	-0.56869674E 01	0.40565000E 04	0.49628913E-00
0.48964477E-06	0.72320512E-07	0.67704826E 01	0.22316276E 08	0.67424250E 00

RSQ =	0.9537
R =	0.9766
F(2, 3)=	30.8999
SUMUSQ =	2.2052
DURBIN-W.=	2.9370



WEST NEW MEX DRY
ESTIMATED COSTFUNCTION
OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1452E 02
B̂ = - 0.3622E-02
Ĉ = 0.4896E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10 2)

Table 30a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN WEST NEW MEXICO

(in dollars)

DEPTH
18000. feet
TOTAL COST
11387.60000
18468.80000
24181.20000
31462.40000
43250.00100
62481.60200
92094.80100
135027.20000
194216.41000
272600.01000
373115.61000
498700.81000
652293.20000
836830.41000
1055250.00000
1310489.60000
1605486.80000
1943179.20000
MINIMUM AVERAGE COST DEPTH
3699. feet
MINIMUM MARGINAL COST DEPTH
2466. feet
MARGINAL COST
8.74480
5.90720
6.00720
9.04480
15.02000
23.93280
35.78320
50.57120
68.29680
88.96000
112.56080
139.09920
168.57520
200.98880
236.34000
274.62881
315.85521
360.01921
POINT OF INFLECTION
28930.22000
MINIMUM AVERAGE COST
7.82122
MINIMUM MARGINAL COST
5.58830

Table 31

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN OKLAHOMA

$\hat{Y} = 11 - 0.12(10^{-2})X_1 + 0.18(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	881.	776161.	8.6300	10.1257	-1.4957
2	1908.	3640464.	8.7400	9.3956	-0.6556
3	3115.	9703225.	10.3800	9.0360	1.3440
4	4401.	19368801.	11.3900	9.2455	2.1445
5	6504.	42302016.	11.6800	10.9053	0.7747
6	8718.	76003524.	12.4900	14.4194	-1.9294
7	11119.	123632161.	20.1800	20.2783	-0.0983
8	13463.	190626184.	27.1600	28.0539	-0.8939
9	17108.	273170916.	44.9900	44.1802	0.8098

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.11062604E 02	0.13609909E 01	0.81283459E 01	0.09999999E 01	0.
-0.12263358E-02	0.39188837E-03	-0.31292987E 01	0.74685555E 04	0.91344202E 00
0.18483342E-06	0.21865149E-07	0.84533346E 01	0.83262486E 08	0.98297115E 00

```
      RSQ =    0.9872
        R =    0.9936
F( 2,  6)=   230.8398
   SUMUSQ =    14.8592
DURBIN-W.=     1.4417
```

OKLAHOMA OIL

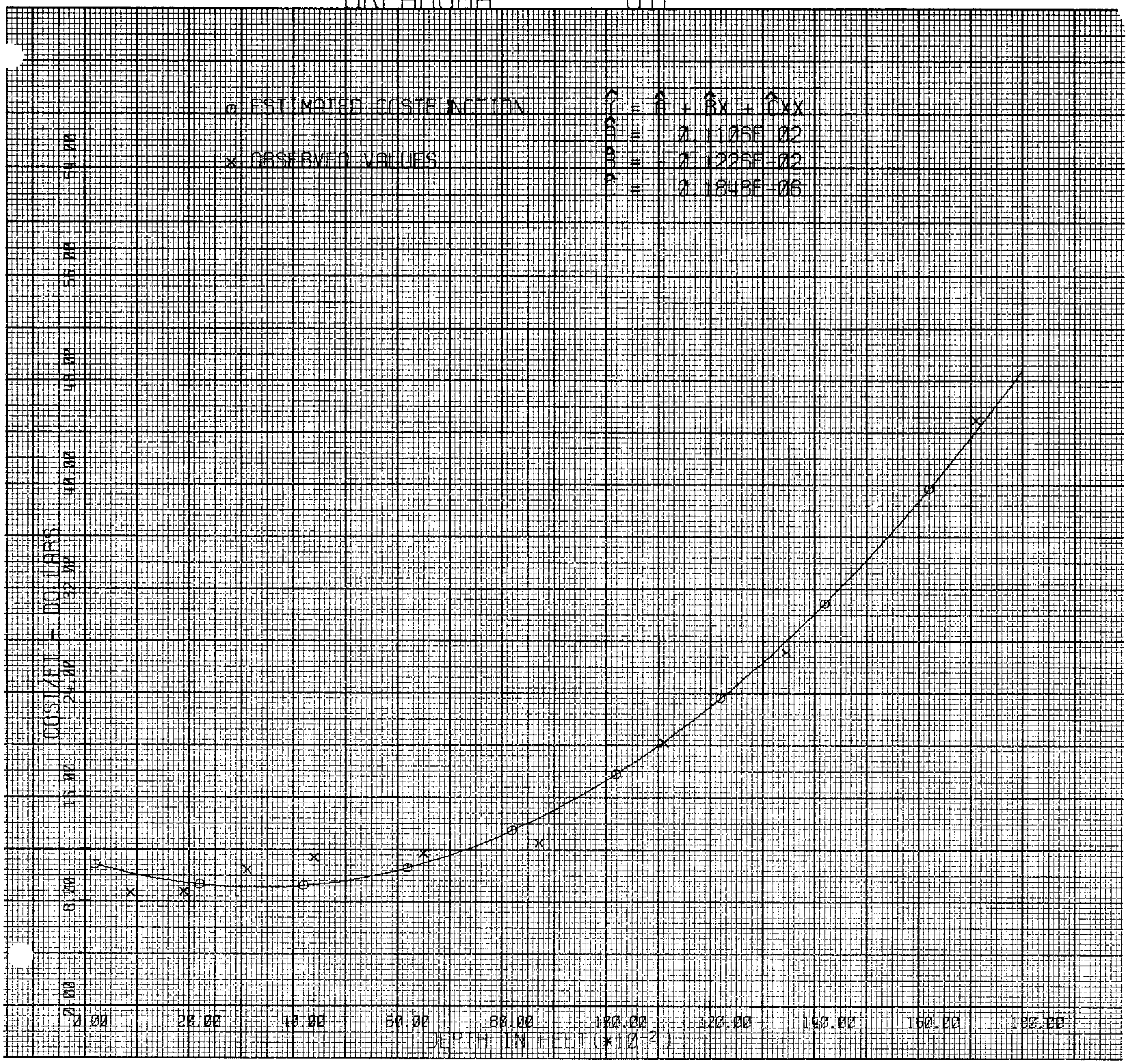


Table 31a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN OKLAHOMA

(in dollars)

```
 DEPTH
   18000.feet
TOTAL COST
         10018.80000
         18694.40000
         27135.60000
         36451.20100
         47750.00100
         62140.80000
         80732.39900
        104633.60000
        134953.20000
        172800.00000
        219282.80000
        275510.40000
        342591.60000
        421635.20000
        513750.00000
        620044.81000
        741628.41000
        879609.61000
MINIMUM AVERAGE COST DEPTH
              3317.feet
MINIMUM MARGINAL COST DEPTH
              2211.feet
MARGINAL COST
             9.16240
             8.37360
             8.69360
            10.12240
            12.66000
            16.30640
            21.06160
            26.92560
            33.89840
            41.98000
            51.17040
            61.46960
            72.87760
            85.39440
            99.02000
           113.75440
           129.59760
           146.54960
POINT OF INFLECTION
         29942.19100
MINIMUM AVERAGE COST
             9.02662
MINIMUM MARGINAL COST
             8.34882
```

Table 32

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN OKLAHOMA

$$\hat{Y} = 12.90 - 0.12(10^{-2})X_1 + 0.16(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	648.	419904.	11.3000	12.1455	-0.8455
2	1504.	2262016.	10.3700	11.3914	-1.0214
3	2878.	8282884.	13.4700	10.6642	2.8058
4	4116.	16941456.	9.5200	10.5188	-0.9988
5	6114.	37380996.	11.6300	11.3038	0.3262
6	8413.	70778569.	14.3500	13.7647	0.5853
7	10857.	117874449.	19.2400	18.2087	1.0313
8	13753.	194572504.	21.7100	25.9132	-4.2032
9	16296.	232779808.	37.1800	34.8596	2.3204

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.12869987E 02	0.19877251E 01	0.64747317E 01	0.09999999E 01	0.
-0.12202635E-02	0.61850923E-03	-0.19729108E 01	0.71754444E 04	0.87304425E 00
0.15768608E-06	0.36310789E-07	0.43426786E 01	0.78738321E 08	0.95151040E 00

RSQ = 0.9426
R = 0.9709
F(2, 6)= 49.2698
SUMUSQ = 35.1922
DURBIN-W.= 2.8737

OKLAHOMA GAS

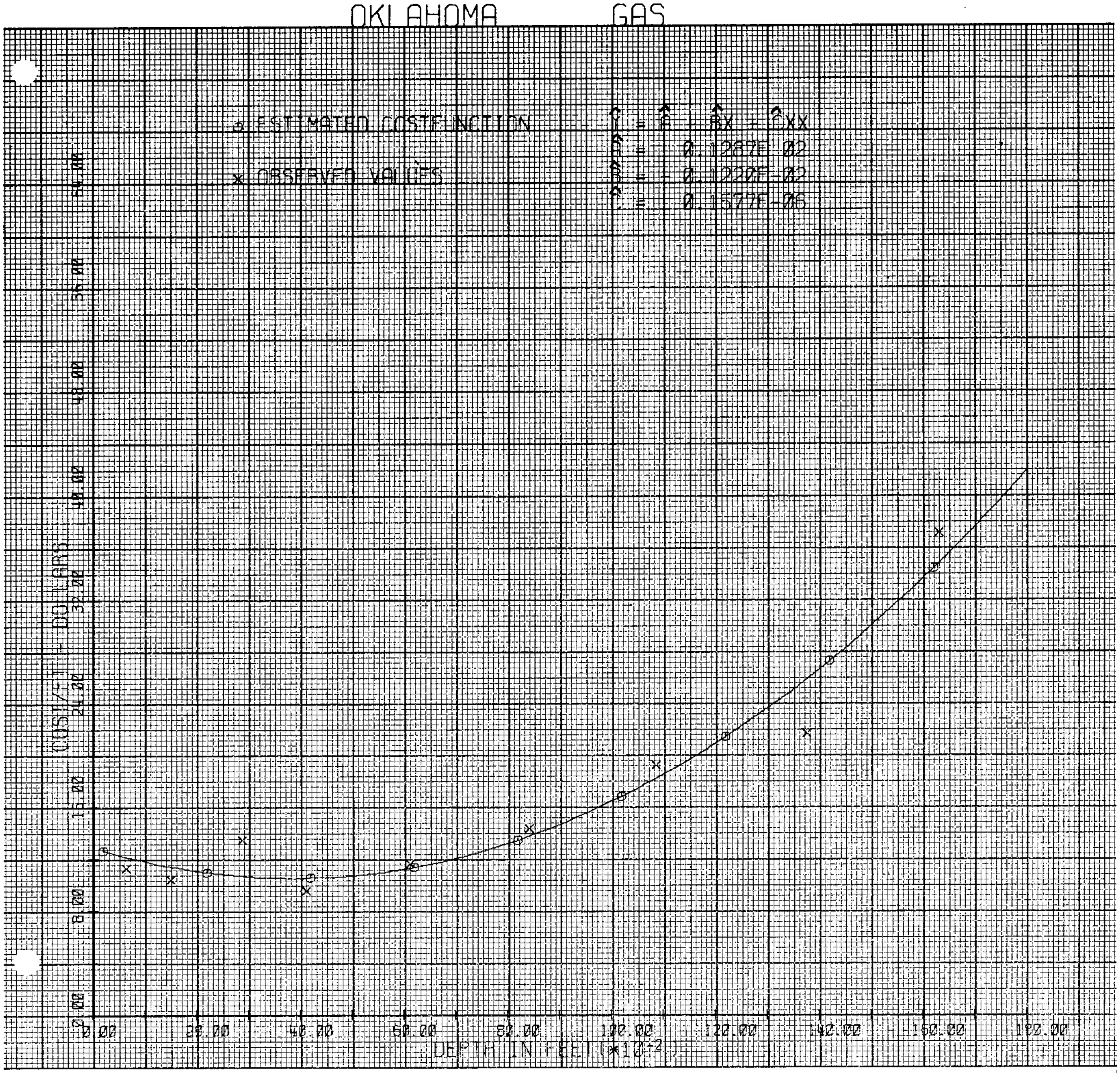


Table 32a

TOTAL AND MARGINAL DRILLING COST FOR GAS WELLS IN OKLAHOMA

(in dollars)

```
   DEPTH
    18000. feet
  TOTAL COST
          11807.70000
          22121.60000
          31887.90000
          42052.80100
          53562.50100
          67363.20100
          84401.10000
         105622.40000
         131973.30000
         164400.00000
         203843.70000
         251265.60000
         307596.90000
         373788.80000
         450787.50000
         539539.20000
         640990.11000
         756086.41000
MINIMUM AVERAGE COST DEPTH
               3868.feet
MINIMUM MARGINAL COST DEPTH
               2579. feet
MARGINAL COST
             10.90310
              9.88240
              9.80790
             10.67960
             12.49750
             15.26160
             18.97190
             23.62840
             29.23110
             35.78000
             43.27510
             51.71640
             61.10390
             71.43760
             82.71750
             94.94360
            108.11590
            122.23440
POINT OF INFLECTION
         40655.53900
MINIMUM AVERAGE COST
             10.51046
MINIMUM MARGINAL COST
              9.72394
```

Table 33

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN OKLAHOMA

$$\hat{Y} = 8.10 - 0.10(10^{-2})X_1 + 0.18(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	888.	788544.	7.4200	7.3431	0.0769
2	1873.	3508129.	6.7100	6.8020	-0.0920
3	3167.	10029889.	7.0500	6.6236	0.4264
4	4414.	19483396.	7.4500	7.0237	0.4263
5	6351.	40335201.	8.5800	8.7587	-0.1787
6	8753.	76615009.	11.4700	12.7919	-1.3219
7	11095.	123099025.	15.6500	18.7302	-3.0802
8	13686.	193653298.	34.0000	27.6075	6.3925
9	16509.	268136770.	37.3900	40.0391	-2.6491

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.81312618E 01	0.27870822E 01	0.29174817E 01	0.09999999E 01	0.
-0.10478366E-02	0.83194815E-03	-0.12594974E 01	0.74151111E 04	0.90912658E 00
0.18054339E-06	0.47688852E-07	0.37858617E 01	0.81523651E 08	0.96709346E 00

RSQ = 0.9488
R = 0.9741
F(2, 6)= 55.5996
SUMUSQ = 59.5264
DURBIN-W.= 2.9658

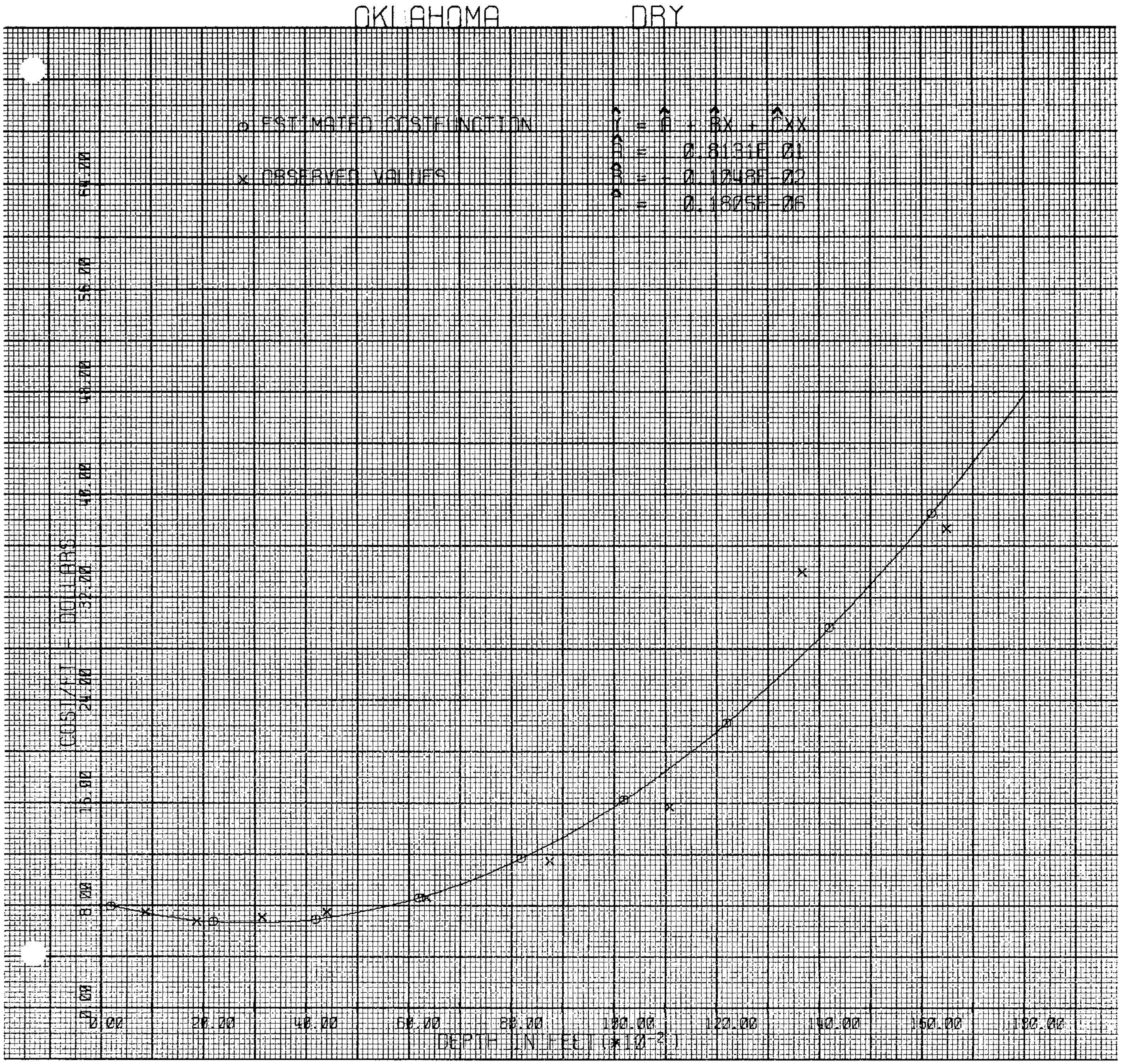

OKLAHOMA DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.8131E 01
B̂ = - 0.1048E-02
Ĉ = 0.1805E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10⁻²)

Table 33a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN OKLAHOMA

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
       7263.50000
      13514.00000
      19834.50000
      27308.00000
      37017.50000
      50046.00000
      67476.50000
      90392.00100
     119875.50000
     157010.00000
     202878.50000
     258564.00000
     325149.50000
     403718.00000
     495352.50000
     601136.00000
     722151.51000
     859482.00000
MINIMUM AVERAGE COST DEPTH
           2903. feet
MINIMUM MARGINAL COST DEPTH
           1935. feet
MARGINAL COST
           6.57650
           6.10500
           6.71650
           8.41100
          11.18850
          15.04900
          19.99250
          26.01900
          33.12850
          41.32100
          50.59650
          60.95500
          72.39650
          84.92100
          98.52850
         113.21900
         128.99250
         145.84900
POINT OF INFLECTION
     19183.57000
MINIMUM AVERAGE COST
           6.60980
MINIMUM MARGINAL COST
           6.10274
```

Table 34

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN EAST TEXAS

$$\hat{Y} = 13.50 - 0.32(10^{-2})X_1 + 0.38(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	671.	450241.	12.4700	11.4760	0.9940
2	1917.	3674889.	7.7500	8.6651	-0.9151
3	3210.	10304100.	6.2600	6.9972	-0.7372
4	4378.	19166884.	6.3900	6.5841	-0.1941
5	6376.	40653376.	9.3100	8.2840	1.0260
6	8755.	76650025.	14.4200	14.2696	0.1504
7	10972.	120384784.	23.4000	23.7241	-0.3241

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.13479058E 02	0.10050416E 01	0.13411442E 02	0.09999999E 01	0.
-0.32404959E-02	0.42793664E-03	-0.75723730E 01	0.51827142E 04	0.72599754E 00
0.38044441E-06	0.35654625E-07	0.10670269E 02	0.38754899E 08	0.86824593E 00

RSQ =	0.9839
R =	0.9919
F(2, 4)=	122.6010
SUMUSQ =	3.5870
DURBIN-W.=	1.7987

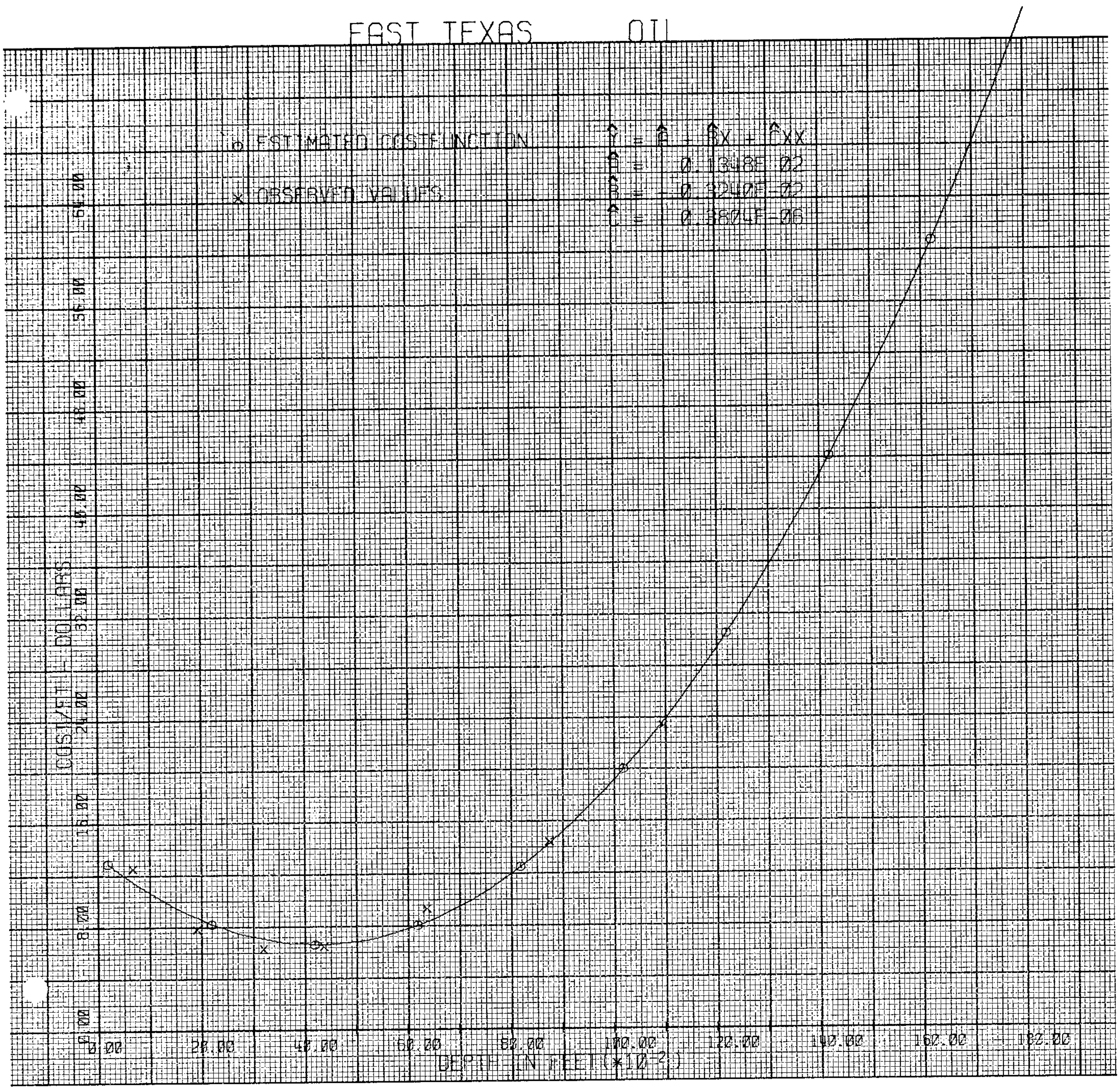

EAST TEXAS OIL
o ESTIMATED COST FUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET (*10^-2)

Table 34 a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN EAST TEXAS

(in dollars)

```
  DEPTH
   18000.feet
 TOTAL COST
        10620.40000
        17043.20000
        21550.80000
        26425.60000
        33950.00000
        46406.40000
        66077.19800
        95244.80000
       136191.60000
       191200.00000
       262552.40000
       352531.20000
       463418.81000
       597497.59000
       757050.01000
       944358.39000
      1161705.20000
      1411372.80000
MINIMUM AVERAGE COST DEPTH
              4259. feet
MINIMUM MARGINAL COST DEPTH
              2839.feet
MARGINAL COST
              8.14120
              5.08480
              4.31080
              5.81920
              9.61000
             15.68320
             24.03880
             34.67680
             47.59720
             62.80000
             80.28520
            100.05280
            122.10280
            146.43520
            173.05000
            201.94720
            233.12680
            266.58881
POINT OF INFLECTION
        28026.11200
MINIMUM AVERAGE COST
            6.58095
MINIMUM MARGINAL COST
            4.28126
```

Table 35

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN EAST TEXAS

$\hat{Y} = 10.60 - 0.14(10^{-2})X_1 + 0.21(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	761.	579121.	11.0000	9.6100	1.3900
2	1772.	3139984.	8.5000	8.7090	-0.2090
3	3023.	9138529.	7.1000	8.1825	-1.0825
4	4345.	18879025.	7.0700	8.3334	-1.2634
5	6177.	38155329.	10.1100	9.7438	0.3662
6	8648.	74787904.	13.5300	13.8569	-0.3269
7	11102.	123254404.	23.2300	20.4546	2.7754
8	13440.	190316800.	27.4200	29.0698	-1.6498

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.10568593E 02	0.16756748E 01	0.63070674E 01	0.09999999E 01	0.
-0.14178455E-02	0.60850254E-03	-0.23300567E 01	0.61584999E 04	0.88423499E 00
0.20791855E-06	0.42208633E-07	0.49259722E 01	0.56070987E 08	0.96034689E 00

RSQ =	0.9627
R =	0.9812
F(2, 5)=	64.5825
SUMUSQ =	15.4097
DURBIN-W.=	2.3165

EAST TEXAS GAS

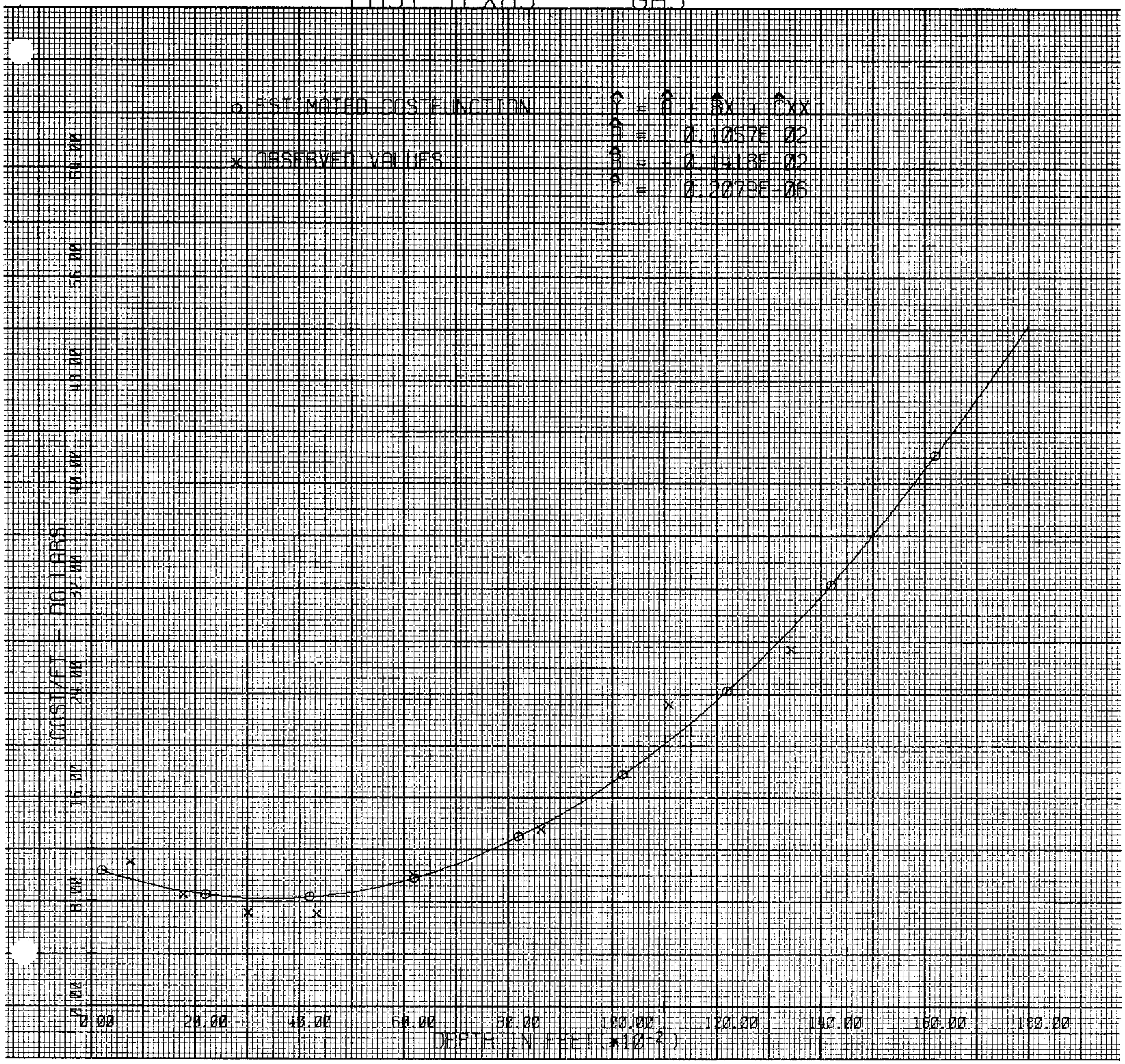


Table 35a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN EAST TEXAS

(in dollars)

```
 DEPTH
  19000. feet
 TOTAL COST
          9359.90000
         17131.20000
         24561.30000
         32897.60000
         43387.50100
         57278.40100
         75817.69900
        100252.80000
        131831.10000
        171830.00000
        221406.90000
        281899.20000
        354524.30000
        440529.59000
        541162.50000
        657670.40000
        791300.71000
        943300.80000
MINIMUM AVERAGE COST DEPTH
              3410. feet
MINIMUM MARGINAL COST DEPTH
              2274. feet
MARGINAL COST
             8.35770
             7.39280
             7.67530
             9.20520
            11.98250
            16.00720
            21.27930
            27.79880
            35.56570
            44.58000
            54.84170
            66.35080
            79.10730
            93.11120
           108.36250
           124.86120
           142.60730
           161.60080
POINT OF INFLECTION
         27801.06000
MINIMUM AVERAGE COST
             8.15210
MINIMUM MARGINAL COST
             7.34614
```

Table 36

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN GULF COAST TEXAS

$\hat{Y} = 9.40 - 0.19(10^{-3})X_1 + 0.89(10^{-7})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

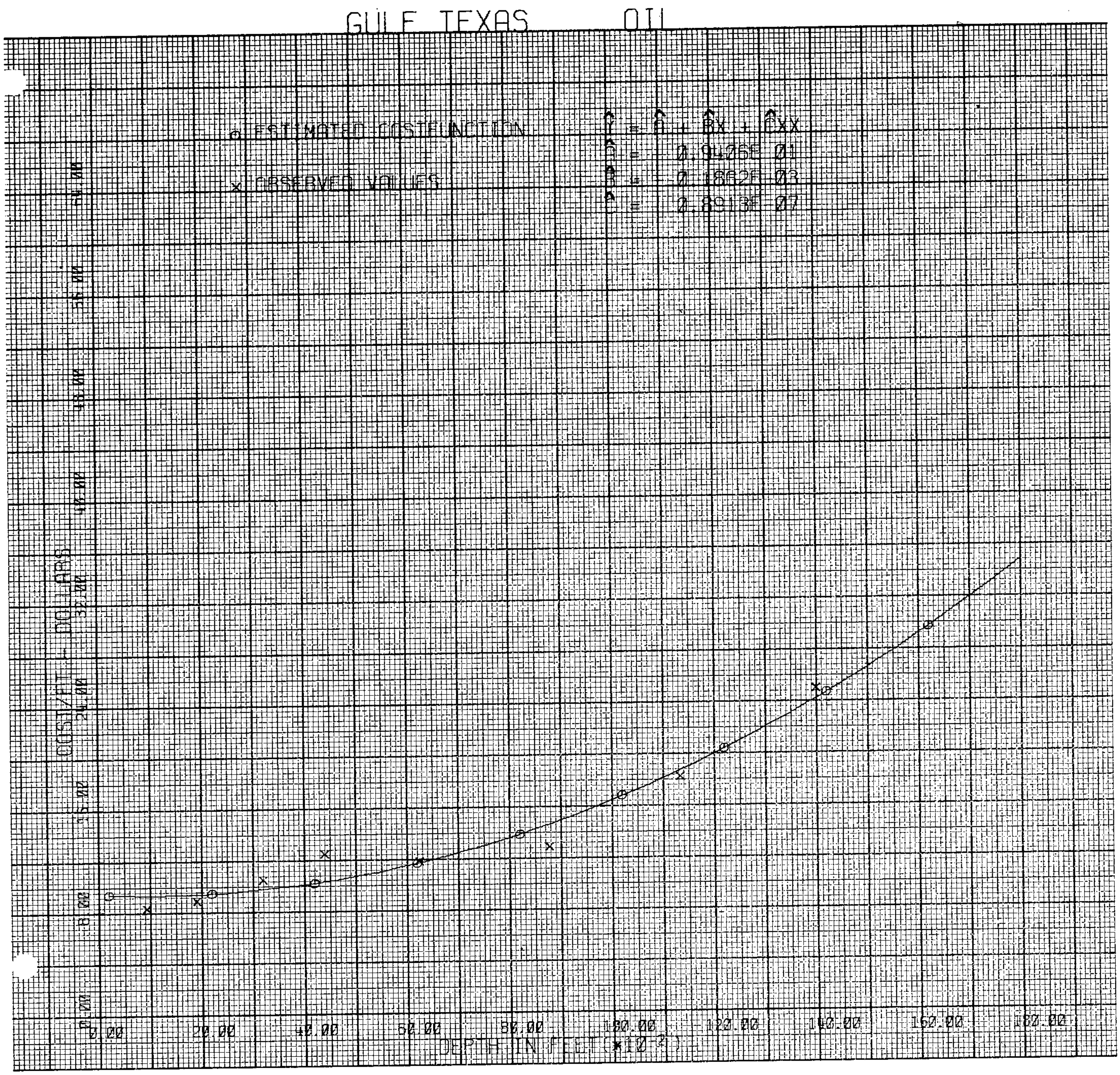
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	945.	893025.	8.3500	9.3102	-0.9602
2	1910.	3648100.	8.8700	9.3760	-0.5060
3	3205.	10272025.	10.4600	9.7253	0.7347
4	4396.	19324816.	12.4500	10.3104	2.1396
5	6235.	38875225.	11.8200	11.7104	0.1096
6	8783.	77141089.	12.8800	14.6465	-1.7665
7	11343.	128663649.	18.2100	18.7619	-0.5519
8	13996.	197944008.	25.0600	24.2594	0.8006

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.94065246E 01	0.14281049E 01	0.65867181E 01	0.09999999E 01	0.
-0.18620212E-03	0.49382114E-03	-0.37706387E-00	0.63516250E 04	0.93873595E 00
0.89127411E-07	0.32672875E-07	0.27278716E 01	0.59338243E 08	0.97514541E 00

RSQ = 0.9523
R = 0.9758
F(2, 5)= 49.8734
SUMUSQ = 10.3739
DURBIN-W.= 1.4136



GULF TEXAS OIL
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.9426E Ø1
B̂ = Ø.1862E Ø3
Ĉ = Ø.8913E Ø7
COST/FT - DOLLARS
Ø.ØØ
8.ØØ
16.ØØ
24.ØØ
32.ØØ
4Ø.ØØ
48.ØØ
56.ØØ
64.ØØ
Ø.ØØ
2Ø.ØØ
4Ø.ØØ
6Ø.ØØ
8Ø.ØØ
1ØØ.ØØ
12Ø.ØØ
14Ø.ØØ
16Ø.ØØ
18Ø.ØØ
DEPTH IN FEET (*1Ø 2)

Table 36a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN GULF COAST TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
         9308.93000
        18780.24000
        28948.71000
        40349.12000
        53516.25100
        68984.88000
        87289.79100
       108965.76000
       134547.57000
       164570.00000
       199567.83000
       240075.84000
       286628.81000
       339761.52000
       400008.76000
       467905.29000
       543985.90000
       628785.36000
MINIMUM AVERAGE COST DEPTH
                1045. feet
MINIMUM MARGINAL COST DEPTH
                 696. feet
MARGINAL COST
             9.30099
             9.73076
            10.69531
            12.19464
            14.22875
            16.79764
            19.90131
            23.53976
            27.71299
            32.42100
            37.66379
            43.44136
            49.75371
            56.60084
            63.98275
            71.89944
            80.35091
            89.33716
POINT OF INFLECTION
         9723.38050
MINIMUM AVERAGE COST
             9.30875
MINIMUM MARGINAL COST
             9.27634
```

Table 37

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN GULF COAST TEXAS

$\hat{Y} = 13.90 - 0.15(10^{-2})X_1 + 0.19(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

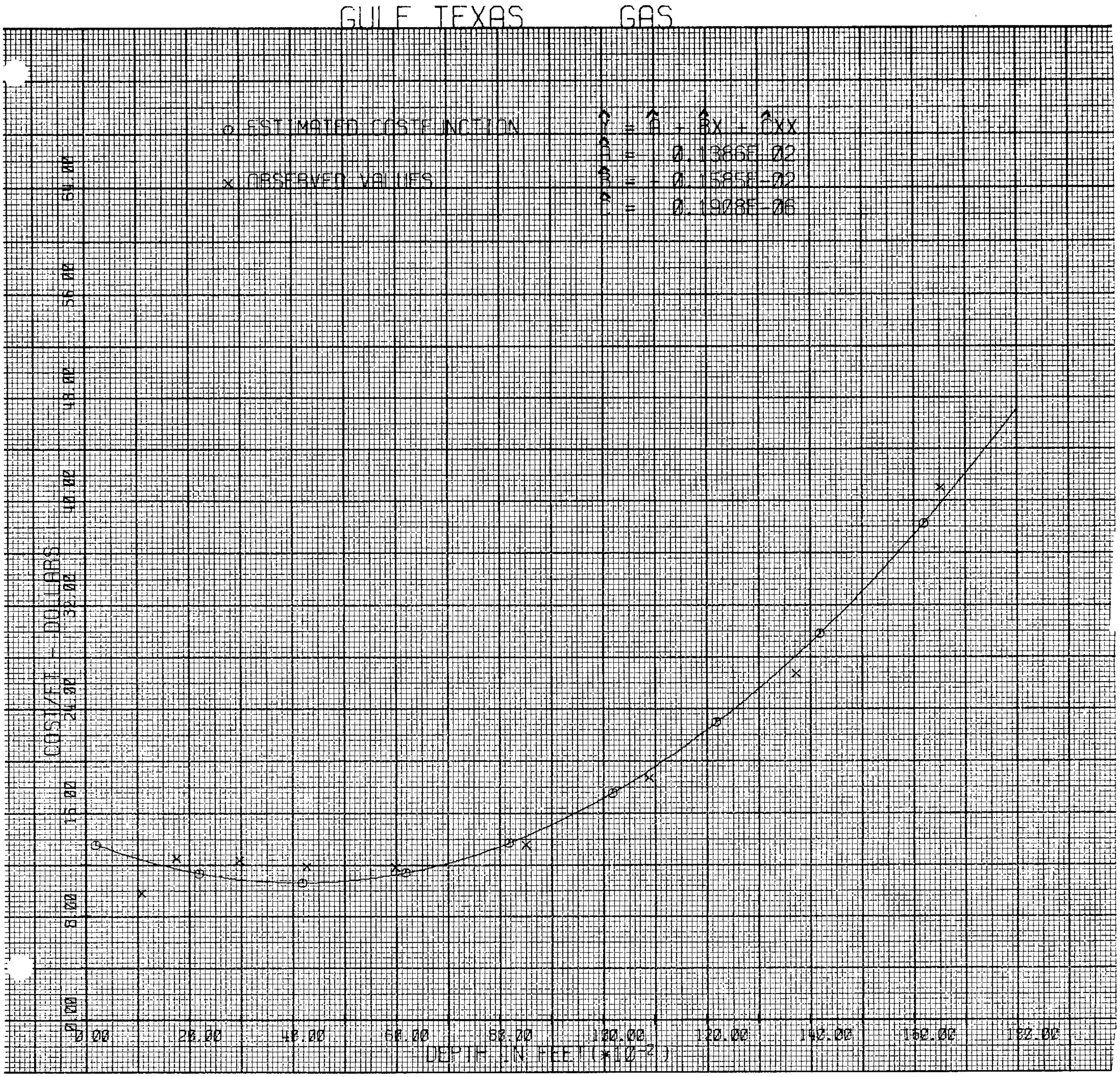
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	OBSERVED VALUES X_2	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1090.	1188100.	9.7900	12.3611	-2.5711
2	1751.	3066001.	12.4500	11.6719	0.7781
3	2986.	8916196.	12.3000	10.8312	1.4688
4	4281.	18326961.	11.8200	10.5749	1.2451
5	5995.	35940025.	11.7600	11.2199	0.5401
6	8523.	72641529.	13.5300	14.2179	-0.6879
7	10898.	118766404.	18.6800	19.2567	-0.5767
8	13745.	194462512.	26.7400	28.1342	-1.3942
9	16528.	268293696.	41.0000	39.8023	1.1977

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.13861742E 02	0.14313317E 01	0.96845064E 01	0.09999999E 01	0.
-0.15847757E-02	0.43205734E-03	-0.36679754E 01	0.73107778E 04	0.89256857E 00
0.19084370E-06	0.24656942E-07	0.77399582E 01	0.80105002E 08	0.96952811E 00

RSQ =	0.9815
R =	0.9907
F(2, 6)=	159.0757
SUMUSQ =	15.3991
DURBIN-W.=	1.3733



GULF TEXAS GAS
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1386E 02
B̂ = - 0.1585E-02
Ĉ = 0.1908E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10⁻²)

Table 37a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN GULF COAST TEXAS

(in dollars)

```
 DEPTH
  18000.feet
 TOTAL COST
        12465.80000
        22906.40000
        32466.60000
        42291.20000
        53525.00100
        67312.80100
        84799.40100
       107129.60000
       135448.20000
       170900.00000
       214629.80000
       267782.40000
       331502.60000
       406935.20000
       495225.01000
       597516.81000
       714955.41000
       848685.61000
MINIMUM AVERAGE COST DEPTH
            4154.feet
MINIMUM MARGINAL COST DEPTH
            2769.feet
MARGINAL COST
          11.26240
           9.80960
           9.50160
          10.33840
          12.32000
          15.44640
          19.71760
          25.13360
          31.69440
          39.40000
          48.25040
          58.24560
          69.38560
          81.67040
          95.10000
         109.67440
         125.39360
         142.25760
POINT OF INFLECTION
        43896.11200
MINIMUM AVERAGE COST
          10.56830
MINIMUM MARGINAL COST
           9.47107
```

Table 38

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN GULF COAST TEXAS

$\hat{Y} = 13.80 - 0.28(10^{-2})X_1 + 0.28(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	840.	705600.	10.5600	11.6226	-1.0626
2	1730.	2992900.	10.0200	9.7686	0.2514
3	3031.	9186961.	8.4800	7.8599	0.6201
4	4287.	18378369.	7.7800	6.9203	0.8597
5	6004.	36048016.	7.2400	7.0709	0.1691
6	8535.	72846225.	9.7400	10.3159	-0.5759
7	10942.	119727364.	16.1900	16.7438	-0.5538
8	13458.	190558882.	26.9500	26.9454	0.0046
9	16664.	269422224.	45.3900	45.1025	0.2875

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.13781044E 02	0.61281663E 00	0.22488038E 02	0.09999999E 01	0.
-0.28057200E-02	0.18384600E-03	-0.15261251E 02	0.72767778E 04	0.84535801E 00
0.28116363E-06	0.10523650E-07	0.26717310E 02	0.79854676E 08	0.95146515E 00

RSQ = 0.9976
R = 0.9988
F(2, 6)= 1258.1919
SUMUSQ = 3.0657
DURBIN-W.= 1.0909

GULF TEXAS DRY

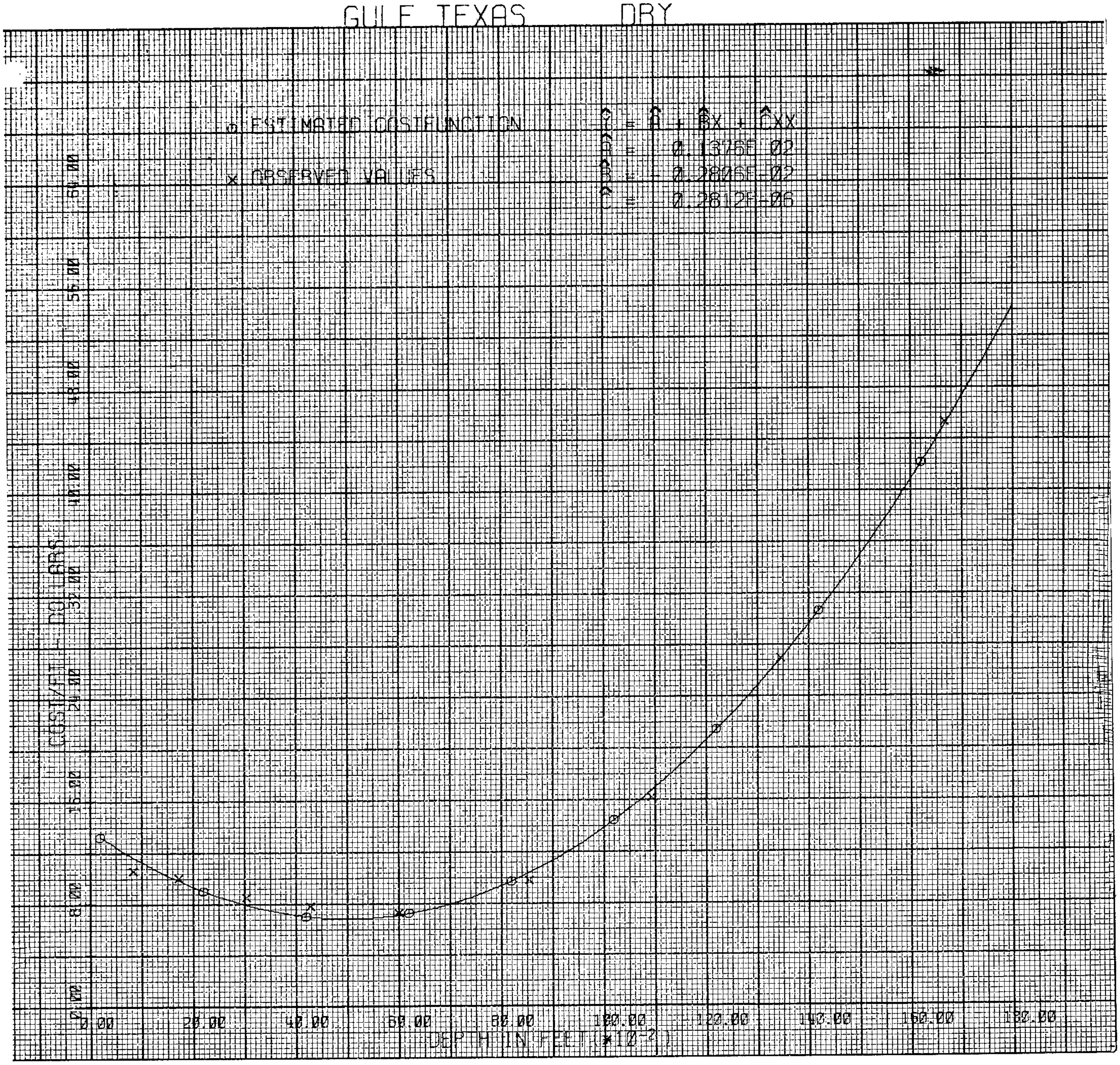


Table 38a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN GULF COAST TEXAS

(in dollars)

```
 DEPTH
  18000. feet
TOTAL COST
        11255.20000
        18585.60000
        23678.40000
        28220.80000
        33900.00100
        42403.20000
        55417.60100
        74630.40100
       101728.80000
       138400.00000
       186331.20000
       247209.60000
       322722.41000
       414556.80000
       524400.01000
       653939.20000
       804861.61000
       978354.42000
MINIMUM AVERAGE COST DEPTH
                 4989. feet
MINIMUM MARGINAL COST DEPTH
                 3326. feet
MARGINAL COST
               9.01160
               5.93040
               4.53640
               4.82960
               6.81000
              10.47760
              15.83240
              22.87440
              31.60360
              42.02000
              54.12360
              67.91440
              83.39240
             100.55760
             119.41000
             139.94960
             162.17640
             186.09040
POINT OF INFLECTION
        33827.50800
MINIMUM AVERAGE COST
               6.77997
MINIMUM MARGINAL COST
               4.44662
```

Table 39

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN NORTH CENTRAL TEXAS

$$\hat{Y} = 5.95 + 0.29(10^{-3})X_1 + 0.43(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	825.	680625.	6.4000	6.2246	0.1754
2	1792.	3211264.	6.4600	6.6170	-0.1570
3	3038.	9229444.	7.0700	7.2424	-0.1724
4	4320.	18662400.	8.0700	8.0265	0.0435
5	6095.	37149025.	9.5400	9.3477	0.1923
6	8546.	73034116.	11.5400	11.6219	-0.0819

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.59539565E 01	0.26165964E-00	0.22754585E 02	0.09999999E 01	0.
0.29219873E-03	0.13634574E-03	0.21430719E 01	0.41026666E 04	0.98674266E 00
0.43415127E-07	0.14159883E-07	0.30660654E 01	0.23661146E 08	0.99190383E 00

```
      RSQ =     0.9936
        R =     0.9968
F( 2,   3)=   233.9064
    SUMUSQ =     0.1307
DURBIN-W.=     1.9482
```

NORTH CEN TEX OIL

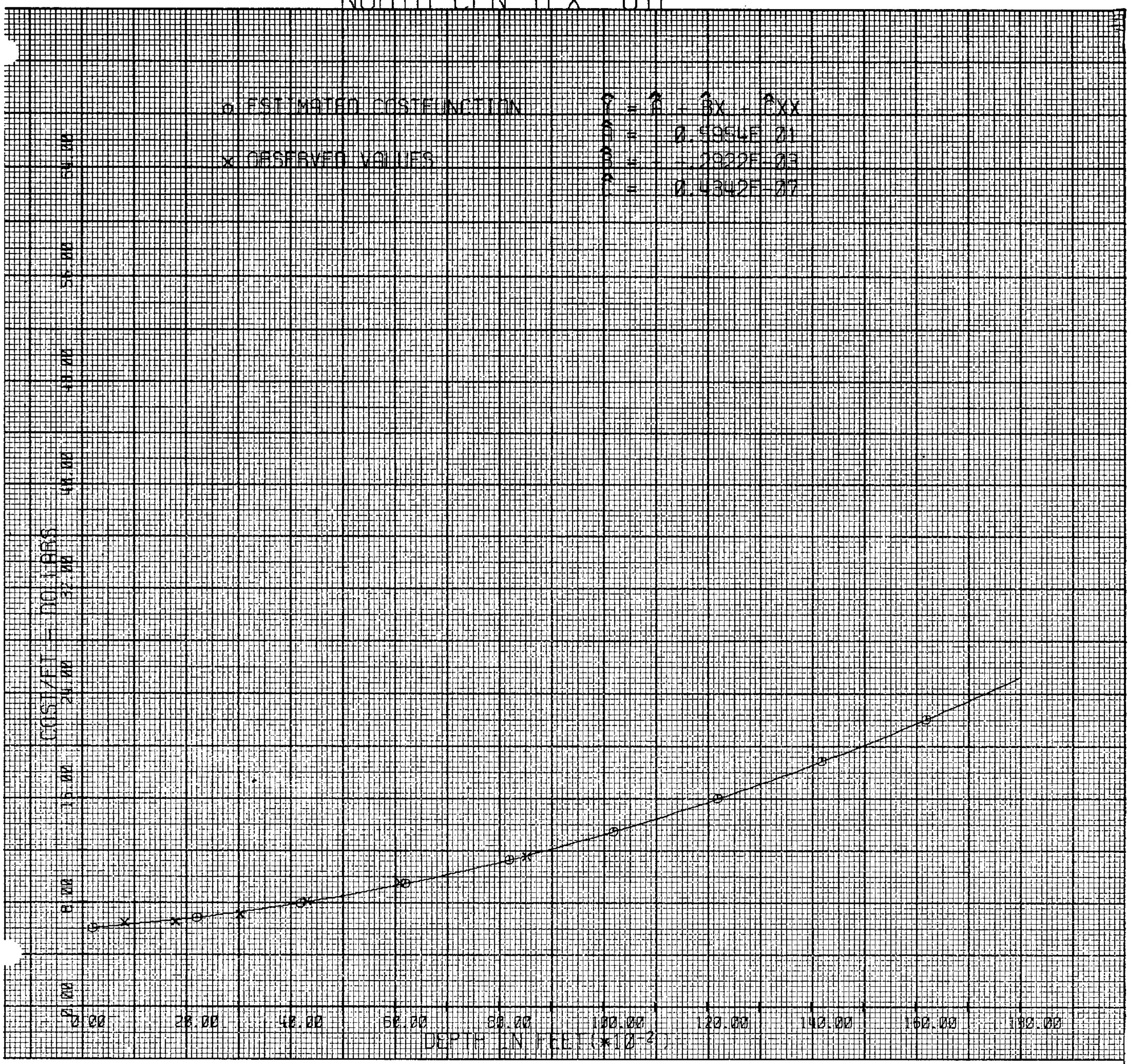


Table 39a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN NORTH CENTRAL TEXAS

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
          6289.62000
         13424.16000
         21664.14000
         31270.08000
         42502.50000
         55621.92100
         70888.86000
         88563.84100
        108907.38000
        132180.00000
        158642.22000
        188554.56000
        222177.54000
        259771.68000
        301597.51000
        347915.52000
        398986.26000
        455070.25000
MINIMUM AVERAGE COST DEPTH
              -3365. feet
MINIMUM MARGINAL COST DEPTH
              -2243. feet
MARGINAL COST
              6.66866
              7.64384
              8.87954
             10.37576
             12.13250
             14.14976
             16.42754
             18.96584
             21.76466
             24.82400
             28.14386
             31.72424
             35.56514
             39.66656
             44.02850
             48.65096
             53.53394
             58.67744
POINT OF INFLECTION
       -18379.93600
MINIMUM AVERAGE COST
              5.46240
MINIMUM MARGINAL COST
              5.29854
```

Table 40

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN NORTH CENTRAL TEXAS

$\hat{Y} = 16.16 - 0.34(10^{-2})X_1 + 0.36(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	882.	777924.	13.8500	13.4533	0.3967
2	1807.	3265249.	11.0300	11.2095	-0.1795
3	3069.	9418761.	8.4400	9.1412	-0.7012
4	4337.	18809569.	8.3200	8.2173	0.1027
5	6141.	37711881.	9.6100	8.8965	0.7135
6	8131.	66113161.	12.0300	12.3621	-0.3321

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.16166199E 02	0.87815559E 00	0.18409266E 02	0.09999999E 01	0.
-0.33931397E-02	0.47503795E-03	-0.71428811E 01	0.40611666E 04	-0.20348234E-00
0.35976984E-06	0.51499553E-07	0.69858827E 01	0.22682757E 08	0.18915436E-01

RSQ = 0.9445
R = 0.9718
F(2, 3)= 25.5200
SUMUSQ = 1.3112
DURBIN-W.= 2.0720

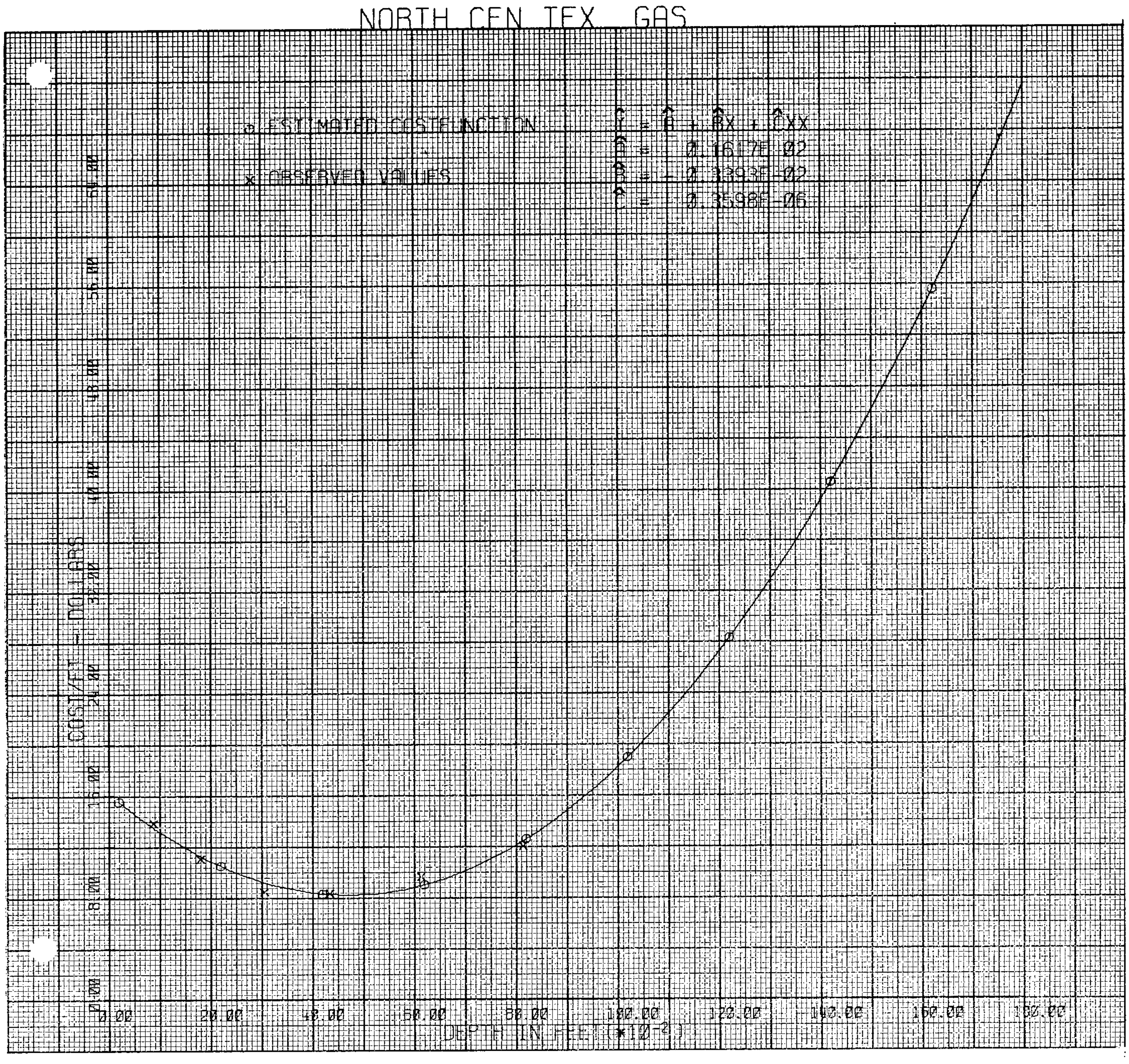

NORTH CEN TEX GAS
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
COST/FT - DOLLARS
DEPTH IN FEET (*10^-2)

Table 40a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN NORTH CENTRAL TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          13136.80000
          21646.40100
          27687.60000
          33419.20100
          41000.00000
          52588.80000
          70344.40200
          96425.60300
         132991.20000
         182200.00000
         246210.80000
         327182.40000
         427273.61000
         548643.21000
         693450.01000
         863852.82000
        1062010.40000
        1290081.60000
MINIMUM AVERAGE COST DEPTH
                 4715. feet
MINIMUM MARGINAL COST DEPTH
                 3143. feet
MARGINAL COST
             10.46340
              6.91560
              5.52660
              6.29640
              9.22500
             14.31240
             21.55860
             30.96360
             42.52740
             56.25000
             72.13140
             90.17160
            110.37060
            132.72840
            157.24500
            183.92040
            212.75460
            243.74760
POINT OF INFLECTION
          38526.29800
MINIMUM AVERAGE COST
              8.17080
MINIMUM MARGINAL COST
              5.50440
```

Table 41

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN NORTH CENTRAL TEXAS

$$\hat{Y} = 8.60 - 0.24(10^{-2})X_1 + 0.30(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

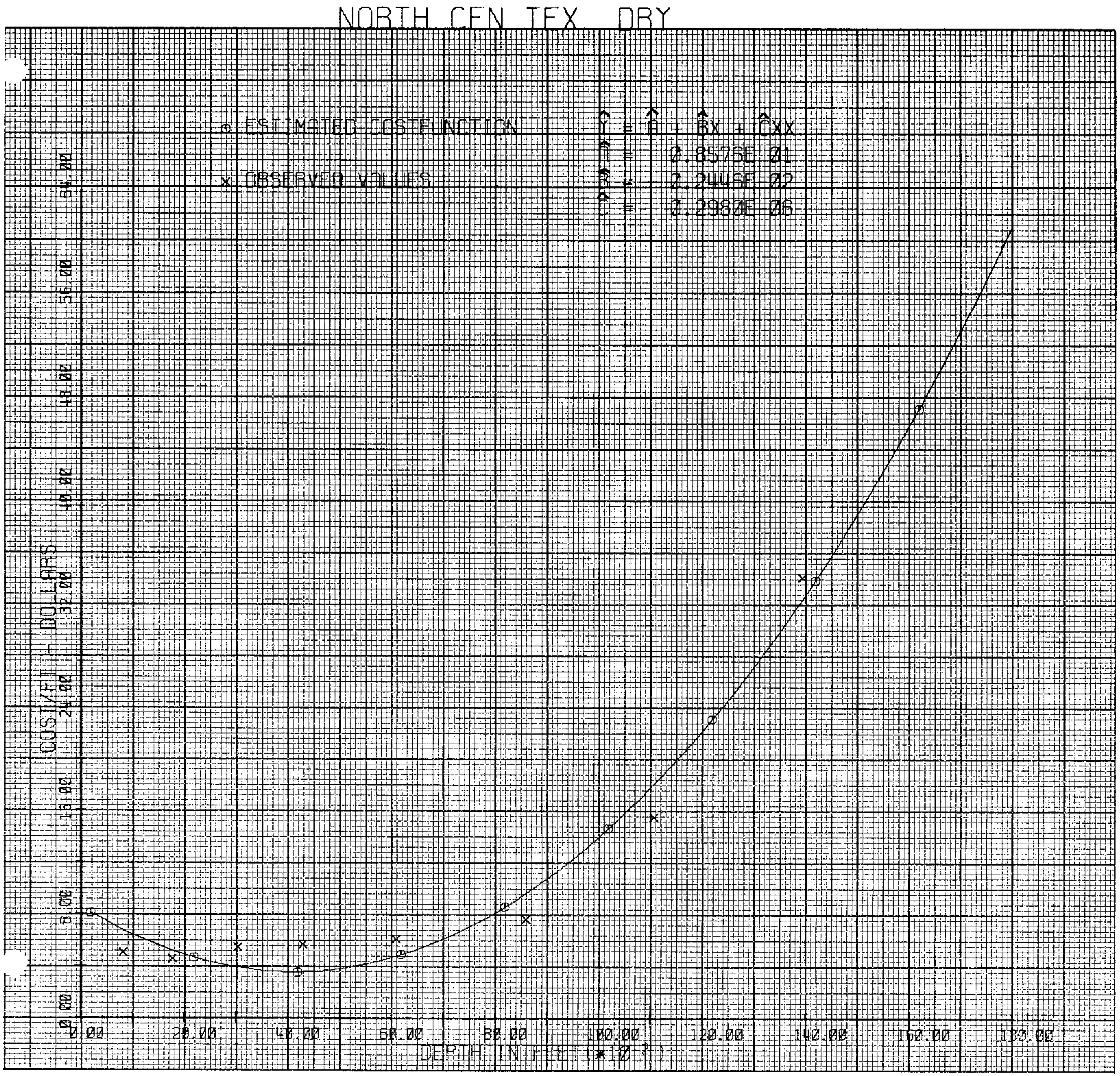
X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	820.	672400.	5.0500	6.7706	-1.7206
2	1787.	3193369.	4.5600	5.1564	-0.5964
3	3039.	9235521.	5.4500	3.8944	1.5556
4	4300.	18490000.	5.6600	3.5676	2.0924
5	6099.	37197801.	6.0900	4.7417	1.3483
6	8606.	74063236.	7.5700	9.5948	-2.0248
7	11071.	122567041.	15.5500	18.0187	-2.4687
8	13937.	197119984.	34.1800	32.3658	1.8142

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y.X)
0.85760517E 01	0.21384872E 01	0.40103355E 01	0.09999999E 01	0.
-0.24461094E-02	0.75089325E-03	-0.32575994E 01	0.62073750E 04	0.84898027E 00
0.29798786E-06	0.50370100E-07	0.59159672E 01	0.57457417E 08	0.94393449E 00

```
     RSQ =    0.9651
       R =    0.9824
F( 2,  5)=   69.1225
  SUMUSQ =   25.4177
DURBIN-W.=    1.4421
```



NORTH CEN TEX DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
$\hat{Y} = \hat{A} + \hat{B}X + \hat{C}XX$
$\hat{A}$ = 0.8576E 01
$\hat{B}$ = 0.2446E-02
$\hat{C}$ = 0.2980E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10-2)

Table 41a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN NORTH CENTRAL TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          6428.00000
          9751.99990
         11760.00000
         14240.00000
         18980.00000
         27768.00000
         42391.99900
         64640.00000
         96300.00000
        139160.00000
        195008.00000
        265632.00000
        352820.00000
        458359.99000
        584040.00000
        731648.00000
        902972.00000
       1099800.00000
MINIMUM AVERAGE COST DEPTH
             4104. feet
MINIMUM MARGINAL COST DEPTH
             2736. feet
MARGINAL COST
             4.57800
             2.36800
             1.94600
             3.31200
             6.46600
            11.40800
            18.13800
            26.65600
            36.96200
            49.05600
            62.93800
            78.60800
            96.06600
           115.31200
           136.34600
           159.16800
           183.77800
           210.17600
POINT OF INFLECTION
         14597.10100
MINIMUM AVERAGE COST
             3.55678
MINIMUM MARGINAL COST
             1.88370
```

Table 42

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN PANHANDLE TEXAS

$$\hat{Y} = 8.80 - 0.48(10^{-3})X_1 + 0.13(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	2052.	4210704.	7.9100	8.3985	-0.4885
2	3250.	10562500.	9.4800	8.6794	0.8006
3	4501.	20259001.	9.5800	9.3887	0.1913
4	6622.	43850884.	10.8800	11.5619	-0.6819
5	8891.	79049881.	14.9400	15.2388	-0.2988
6	11502.	132296004.	21.9800	21.1993	0.7807
7	14066.	198926178.	28.5500	28.8534	-0.3034

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.88223914E 01	0.11015289E 01	0.80092234E 01	0.09999999E 01	0.
-0.48510917E-03	0.33340275E-03	-0.14550244E 01	0.72691428E 04	0.96307448E 00
0.13573048E-06	0.20479185E-07	0.66277288E 01	0.69725904E 08	0.99536333E 00

RSQ =	0.9940
R =	0.9970
F(2, 4)=	328.5868
SUMUSQ =	2.1720
DURBIN-W.=	2.4323

PANHANDLE TEX. OIL

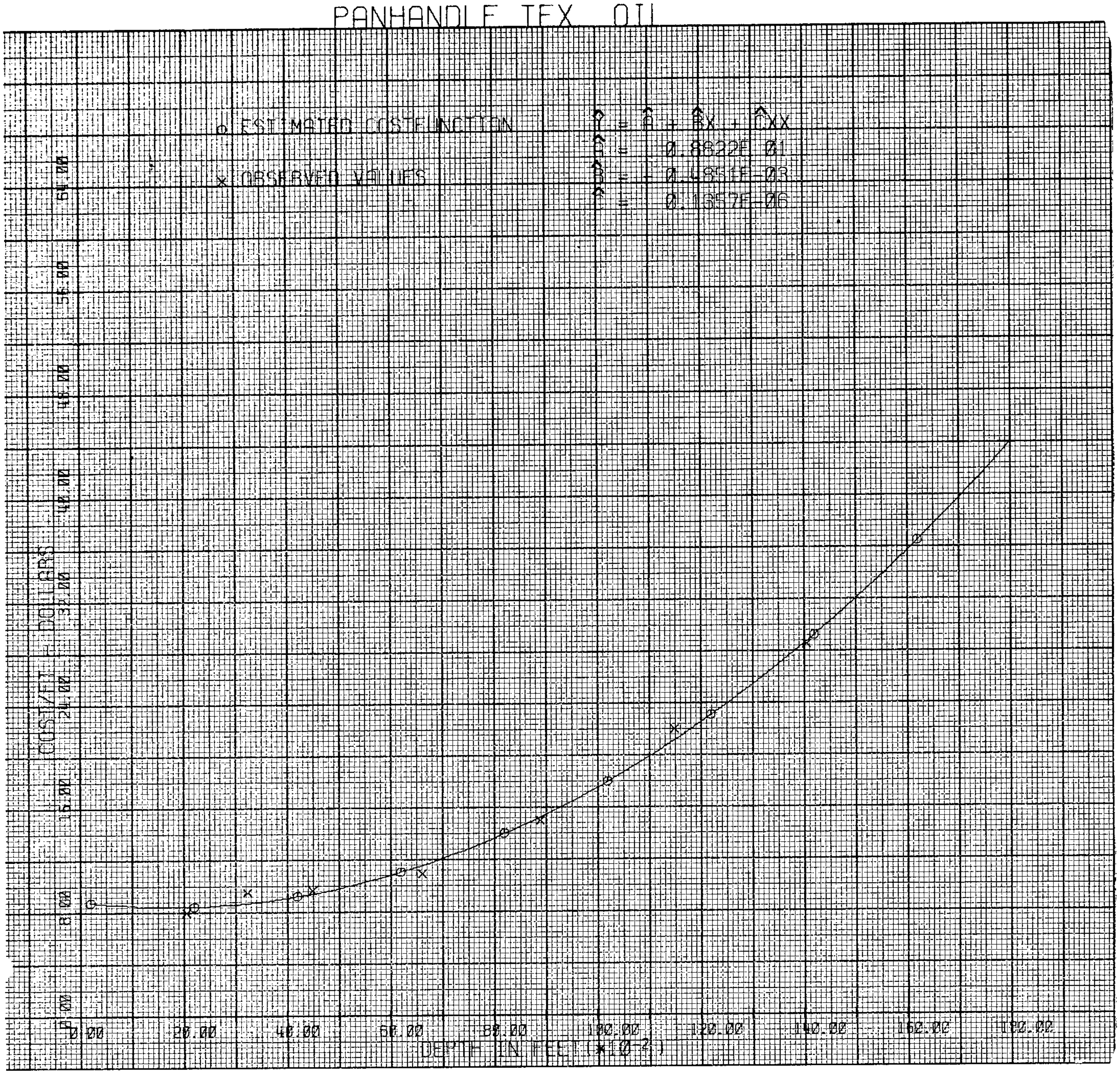


Table 42a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN PANHANDLE TEXAS

(in dollars)

```
DEPTH
  18000. feet
TOTAL COST
           8472.60000
          16789.20000
          25764.00000
          36211.20100
          48945.00100
          64779.60000
          84529.20100
         109008.00000
         139030.20000
         175410.00000
         218961.60000
         270499.20000
         330837.00000
         400789.20000
         481170.00000
         572793.60000
         676474.21000
         793026.00000
MINIMUM AVERAGE COST DEPTH
              1787. feet
MINIMUM MARGINAL COST DEPTH
              1192. feet
MARGINAL COST
              8.25890
              8.51000
              9.57530
             11.45480
             14.14850
             17.65640
             21.97850
             27.11480
             33.06530
             39.83000
             47.40890
             55.80200
             65.00930
             75.03080
             85.86650
             97.51640
            109.98050
            123.25880
POINT OF INFLECTION
          14993.53400
MINIMUM AVERAGE COST
              8.38847
MINIMUM MARGINAL COST
              8.24396
```

Table 43

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN PANHANDLE TEXAS

$\hat{Y} = 17 - 0.28(10^{-2})X_1 + 0.40(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	798.	636804.	15.6000	15.0103	0.5897
2	1871.	3500641.	13.5600	13.1789	0.3811
3	3192.	10188864.	10.3600	12.1848	-1.8248
4	4270.	18232900.	11.5800	12.4044	-0.8244
5	6118.	37429924.	17.4800	14.9363	2.5437
6	8552.	73136704.	21.5600	22.4255	-0.8655

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.16967462E 02	0.24796499E 01	0.68426846E 01	0.09999999E 01	0.
-0.27707126E-02	0.12759406E-02	-0.21715058E 01	0.41334999E 04	0.66553251E 00
0.39861197E-06	0.13217060E-06	0.30158897E 01	0.23854306E 08	0.80290894E 00

RSQ =	0.8618
R =	0.9284
F(2, 3)=	9.3565
SUMUSQ =	11.7221
DURBIN-W.=	2.4635

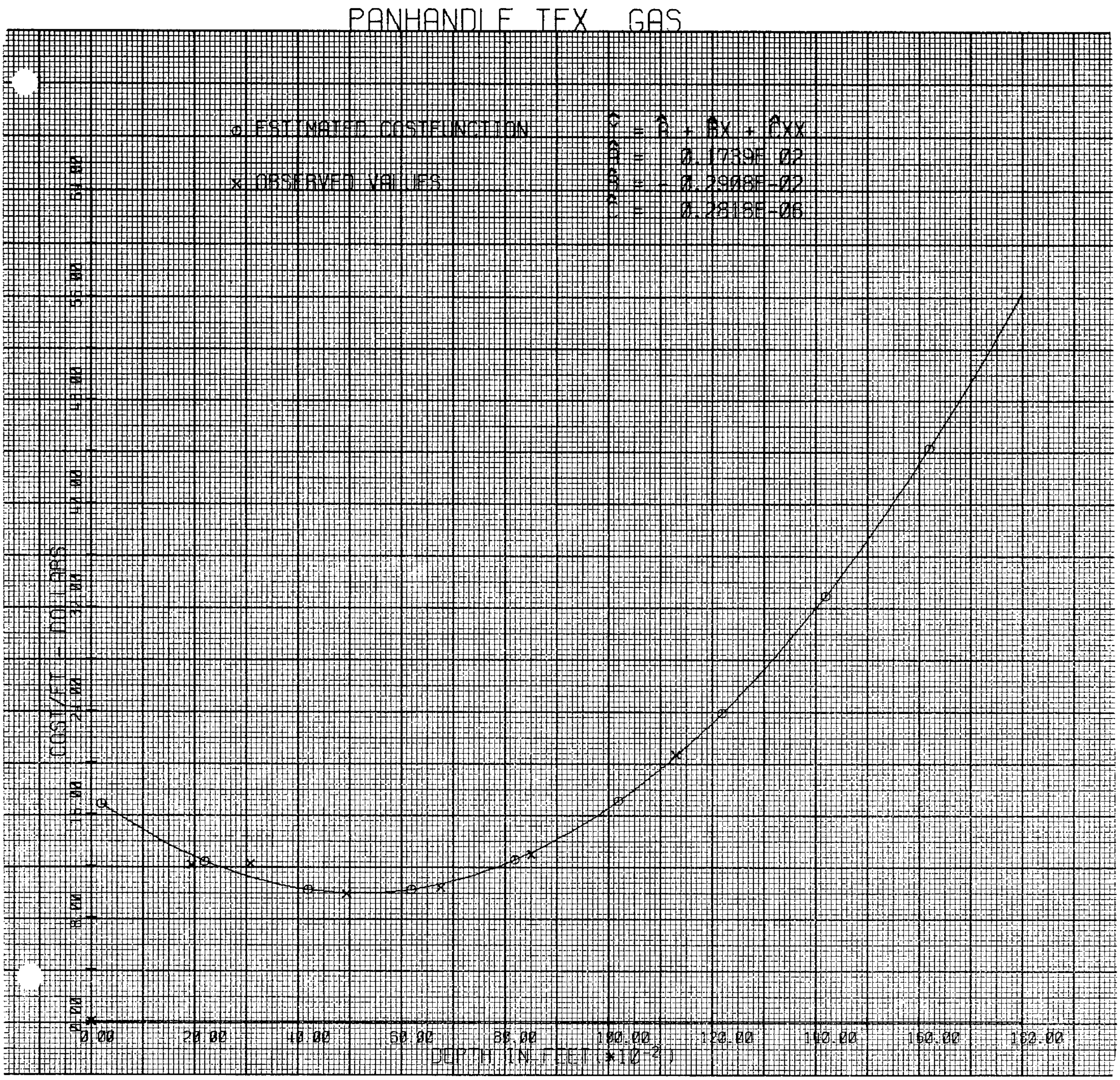

PANHANDLE TEX GAS
⊙ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1739E 02
B̂ = - 0.2908E-02
Ĉ = 0.2818E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10^-2)

Table 43a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN PANHANDLE TEXAS

(in dollars)

```
 DEPTH
  18000. feet
TOTAL COST
        14763.80000
        25402.40000
        33606.60000
        41067.20000
        49475.00100
        60520.80100
        75895.40000
        97289.60000
       126394.20000
       164900.00000
       214497.80000
       276878.40000
       353732.60000
       446751.20000
       557625.01000
       688044.81000
       839701.41000
      1014285.60000
MINIMUM AVERAGE COST DEPTH
                 5160. feet
MINIMUM MARGINAL COST DEPTH
                 3440. feet
MARGINAL COST
             12.41940
              9.13960
              7.55060
              7.65240
              9.44500
             12.92840
             18.10260
             24.96760
             33.52340
             43.77000
             55.70740
             69.33560
             84.65460
            101.66440
            120.36500
            140.75640
            162.83860
            186.61160
POINT OF INFLECTION
        51018.03400
MINIMUM AVERAGE COST
             9.88781
MINIMUM MARGINAL COST
             7.38709
```

Table 44

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN PANHANDLE TEXAS

$\hat{Y} = 2.90 + 0.15(10^{-2})X$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_i = Depth

SAMPLE	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
NUMBER	X	Y	$\hat{Y}$	$Y - \hat{Y}$
1	832.	4.8000	4.1287	0.6713
2	1852.	5.4900	5.6344	-0.1444
3	3120.	9.5700	7.5063	2.0637
4	4387.	10.8100	9.3767	1.4333
5	6388.	9.9900	12.3322	-2.3422
6	8533.	12.1400	15.4973	-3.3573
7	11472.	16.2200	19.8360	-3.6160
8	13621.	28.3000	23.0084	5.2916

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.29004278E 01	0.20486338E 01	0.14157862E 01	0.09999999E 01	0.
0.14762492E-02	0.26903588E-03	0.54871833E 01	0.62757500E 04	0.91314696E 00

RSQ =	0.8338
R =	0.9131
F(1, 6)=	30.1092
SUMUSQ =	64.6176
DURBIN-W.=	1.5574

PANHANDLE TEX DRY

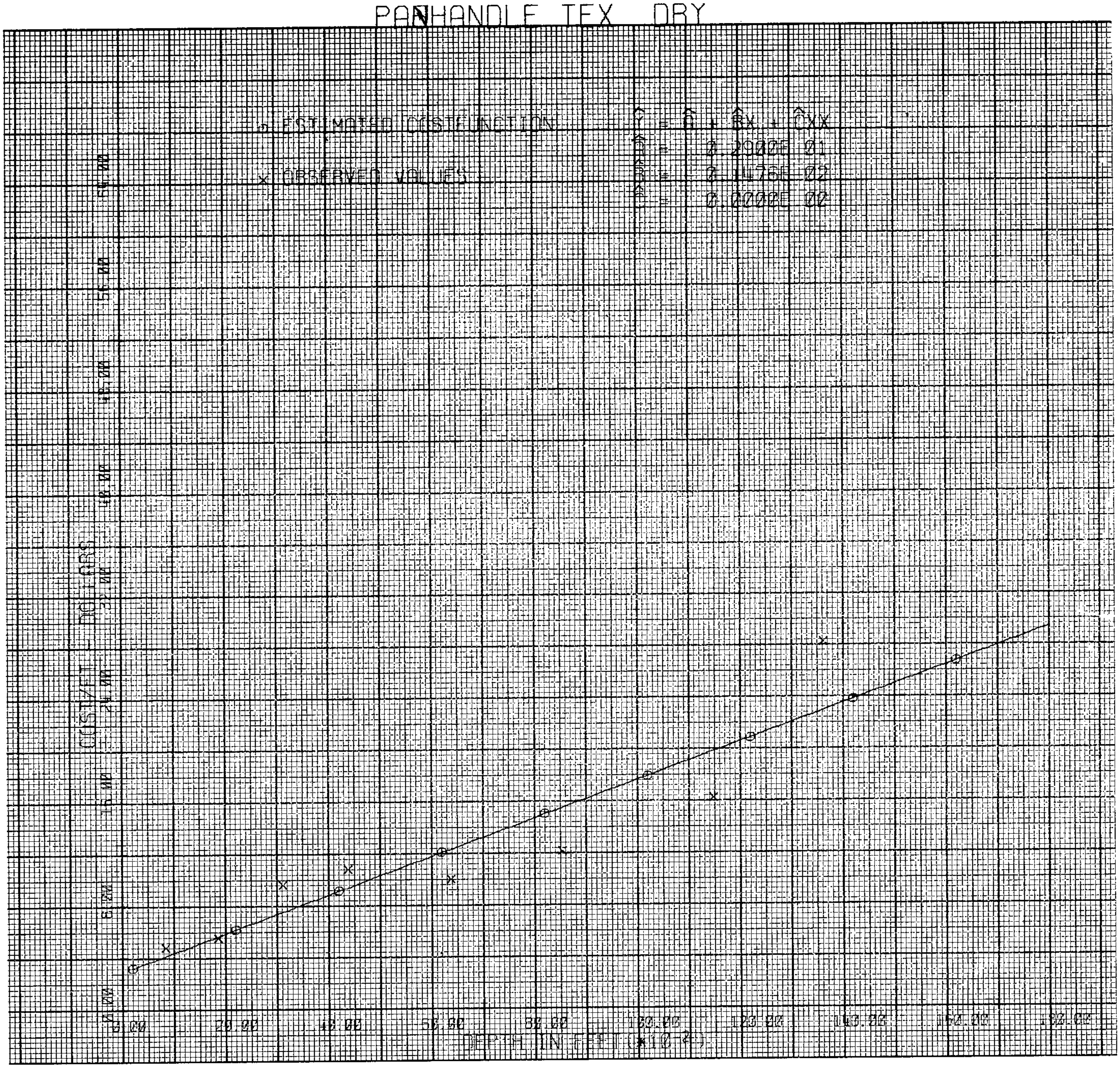


Table 45

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN SOUTH WEST TEXAS

$\hat{Y} = 12.90 - 0.28(10^{-2})X_1 + 0.32(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	787.	619369.	10.2100	10.8706	-0.6606
2	1827.	3337929.	8.4700	8.8365	-0.3665
3	3101.	9616201.	7.9000	7.2789	0.6211
4	4349.	18913801.	7.8500	6.7506	1.0994
5	6195.	38378025.	8.1800	7.7790	0.4010
6	8360.	69889600.	11.2500	11.7370	-0.4870
7	11430.	130644900.	19.5700	22.4425	-2.8725
8	12760.	181408800.	31.2000	28.9349	2.2651

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.12865459E 02	0.17818746E 01	0.72201820E 01	0.09999999E 01	0.
-0.27842205E-02	0.66751281E-03	-0.41710366E 01	0.61011250E 04	0.82056715E 00
0.31689490E-06	0.47600417E-07	0.66573974E 01	0.54277178E 08	0.92285074E 00

RSQ = 0.9669
R = 0.9833
F(2, 5)= 72.9906
SUMUSQ = 15.9453
DURBIN-W.= 2.1732

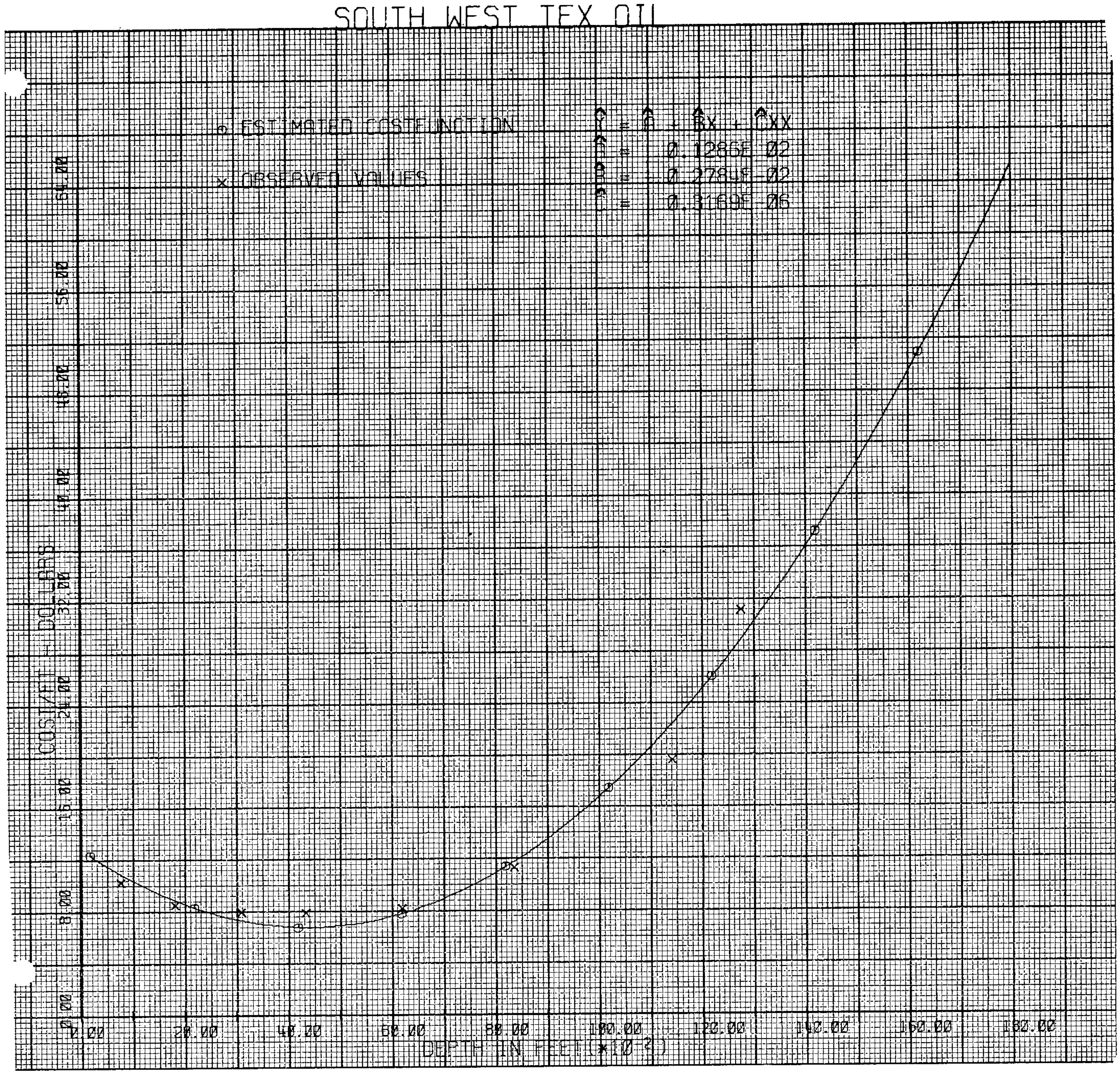

SOUTH WEST TEX OIL
⊙ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ĉ = Â + B̂X + ĈXX
Â = 0.1286E 02
B̂ = 0.2784E-02
Ĉ = 0.3169E 06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (×10⁻²)

Table 45a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN SOUTHWEST TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          10392.90000
          17119.20000
          22080.30000
          27177.60000
          34312.50000
          45386.40100
          62300.70000
          86956.79900
         121256.10000
         167100.00000
         226389.90000
         301027.20000
         392913.30000
         503949.60000
         636037.50000
         791078.39000
         970973.70000
        1177624.80000
MINIMUM AVERAGE COST DEPTH
               4393. feet
MINIMUM MARGINAL COST DEPTH
               2928. feet
MARGINAL COST
              8.24270
              5.52680
              4.71230
              5.79920
              8.78750
             13.67720
             20.46830
             29.16080
             39.75470
             52.25000
             66.64670
             82.94480
            101.14430
            121.24520
            143.24750
            167.15120
            192.95630
            220.66280
POINT OF INFLECTION
          29630.25700
MINIMUM AVERAGE COST
              6.74557
MINIMUM MARGINAL COST
              4.70742
```

Table 46

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN SOUTH WEST TEXAS

$$\hat{Y} = 7.50 - 0.7(10^{-3})X_1 + 0.21(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

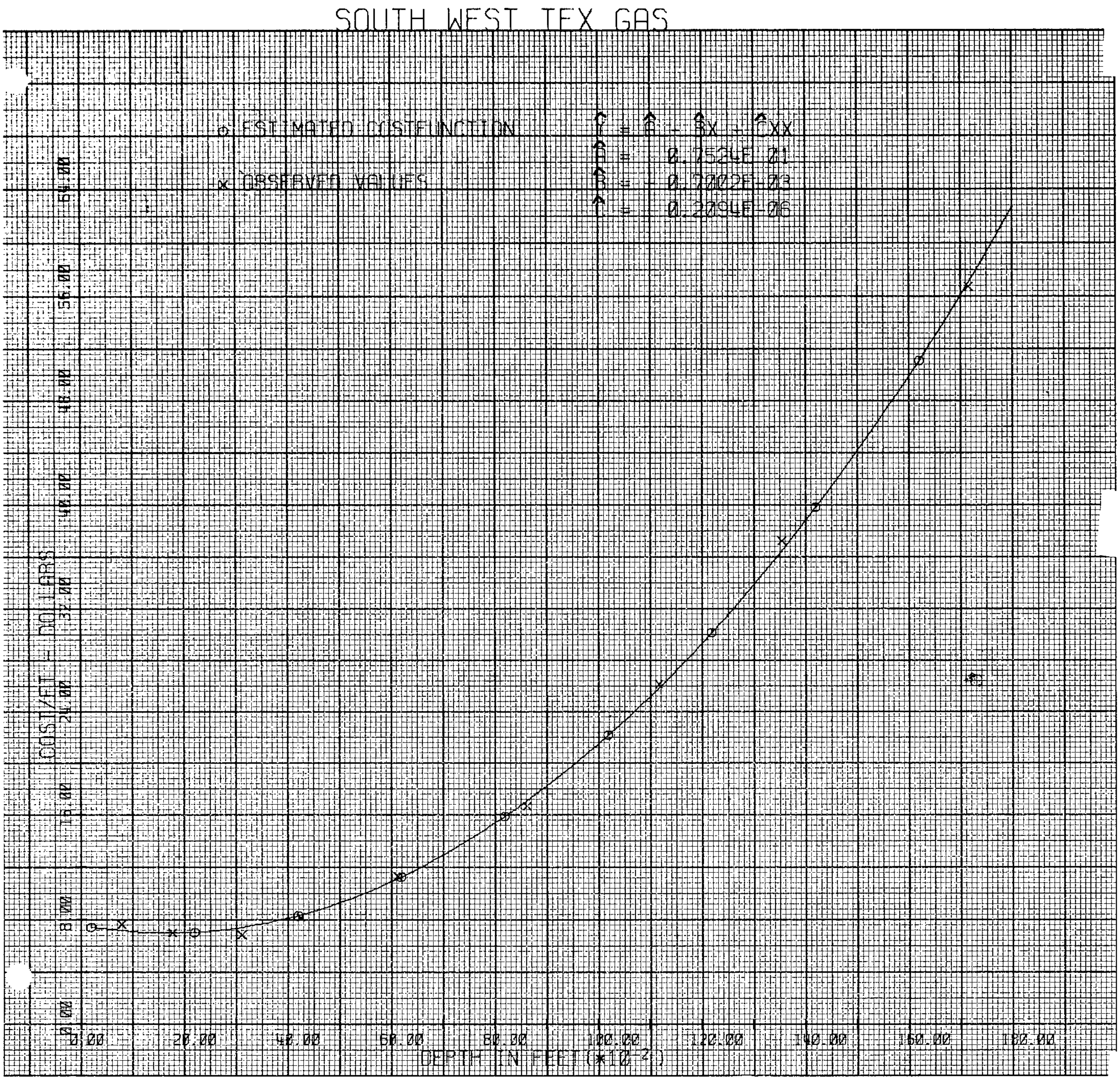
X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	802.	643204.	7.6000	7.0967	0.5033
2	1779.	3164841.	6.9500	6.9408	0.0092
3	3113.	9690769.	6.8200	7.3737	-0.5537
4	4254.	18096516.	8.1400	8.3355	-0.1955
5	6139.	37687321.	11.2900	11.1190	0.1710
6	8635.	74563225.	16.6300	17.0953	-0.4653
7	11190.	125216100.	26.1700	25.9158	0.2542
8	13563.	191977484.	37.2500	36.5574	0.6926
9	17160.	273616400.	56.7700	57.1858	-0.4158

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.75235213E 01	0.43163382E-00	0.17430333E 02	0.09999999E 01	0.
-0.70015248E-03	0.12602250E-03	-0.55557737E 01	0.74038889E 04	0.95065692E 00
0.20945372E-06	0.70345253E-08	0.29775104E 02	0.83053616E 08	0.99801023E 00

```
      RSQ =     0.9994
        R =     0.9997
F( 2,   6)= 4633.5646
   SUMUSQ =     1.5611
DURBIN-W.=     2.0286
```



SOUTH WEST TEX GAS
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â - B̂X + ĈXX
Â = 0.7524E 01
B̂ = - 0.7002E-03
Ĉ = 0.2094E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10 2)

Table 46a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN SOUTHWEST TEXAS

(in dollars)

```
DEPTH
  18000. feet
TOTAL COST
         7033.20000
        13922.40000
        21924.00000
        32294.40100
        46290.00000
        65167.20100
        90182.40100
       122592.00000
       163652.40000
       214620.00000
       276751.20000
       351302.40000
       439530.00000
       542690.40000
       662040.00000
       798835.21000
       954332.40000
      1129788.00000
MINIMUM AVERAGE COST DEPTH
              1672. feet
MINIMUM MARGINAL COST DEPTH
              1115. feet
MARGINAL COST
             6.75180
             7.23600
             8.97660
            11.97360
            16.22700
            21.73680
            28.50300
            36.52560
            45.80460
            56.34000
            68.13180
            81.18000
            95.48460
           111.04560
           127.86300
           145.93680
           165.26700
           185.85360
POINT OF INFLECTION
        11600.88500
MINIMUM AVERAGE COST
             6.93866
MINIMUM MARGINAL COST
             6.74355
```

Table 47

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN SOUTH WEST TEXAS

$\hat{Y} = 3.90 - 0.43(10^{-3})X_1 + 0.16(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	815.	664225.	4.0600	3.6540	0.4060
2	1806.	3261636.	3.4600	3.6350	-0.1750
3	3049.	9296401.	4.0800	4.0481	0.0319
4	4291.	18412681.	6.0300	4.9464	1.0836
5	6122.	37478884.	5.5900	7.1559	-1.5659
6	8635.	74563225.	10.4800	11.9059	-1.4259
7	11215.	125776225.	19.3300	18.8499	0.4801
8	13464.	190639648.	28.5300	26.6115	1.9185
9	18690.	287329025.	50.0400	50.7932	-0.7532

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.39011955E 01	0.10649510E 01	0.36632629E 01	0.09999999E 01	0.
-0.43150876E-03	0.28674909E-03	-0.15048303E 01	0.75652222E 04	0.94708916E 00
0.15732723E-06	0.14798908E-07	0.10631002E 02	0.88894296E 08	0.99641670E 00

RSQ =	0.9948
R =	0.9974
F(2, 6)=	574.6333
SUMUSQ =	10.3346
DURBIN-W.=	2.0674

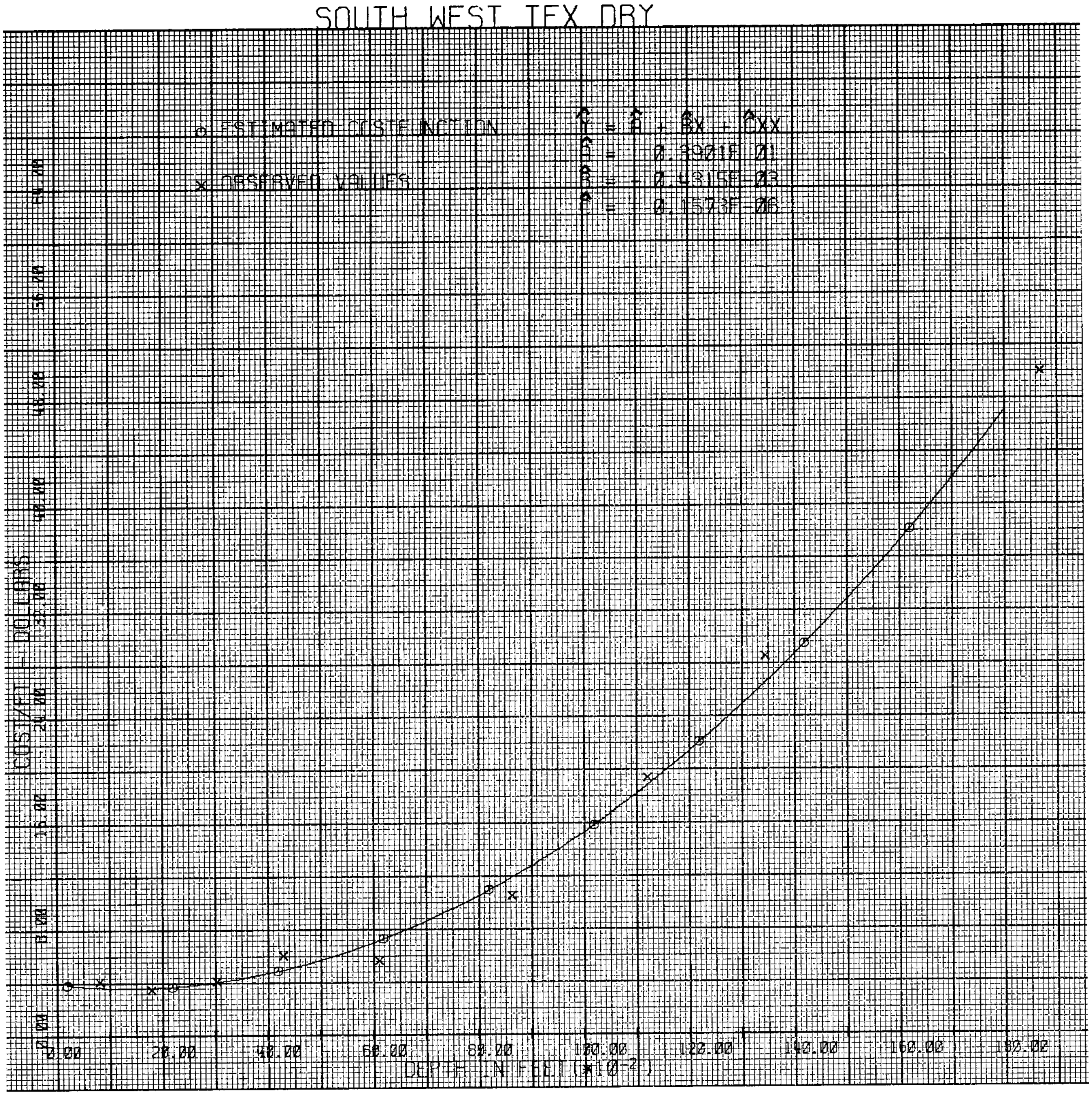

SOUTH WEST TEX DRY
o ESTIMATED COST FUNCTION
x OBSERVED VALUES
Y = A + BX + CXX
A = 0.3901E 01
B = 0.4315E-03
C = 0.1573E-06
COST/FT - DOLLARS
DEPTH IN FEET (*10^-2)

Table 47a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN SOUTHWEST TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
          3626.80000
          7334.40000
         12066.60000
         18767.20000
         28380.00000
         41848.80100
         60117.40100
         84129.60100
        114829.20000
        153160.00000
        200065.80000
        256490.40000
        323377.60000
        401671.20000
        492315.00000
        596252.80000
        714428.41000
        847785.60000
MINIMUM AVERAGE COST DEPTH
               1372. feet
MINIMUM MARGINAL COST DEPTH
                914. feet
MARGINAL COST
             3.50990
             4.06260
             5.55910
             7.99940
            11.38350
            15.71140
            20.98310
            27.19860
            34.35790
            42.46100
            51.50790
            61.49860
            72.43310
            84.31140
            97.13350
           110.89940
           125.60910
           141.26260
POINT OF INFLECTION
         4944.66760
MINIMUM AVERAGE COST
             3.60508
MINIMUM MARGINAL COST
             3.50644
```

Table 48

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN WEST TEXAS

$\hat{Y} = 16.70 - 0.21(10^{-2})X_1 + 0.17(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	771.	594441.	16.2000	15.2088	0.9912
2	1821.	3316041.	13.5000	13.5105	-0.0105
3	3091.	9554281.	11.3900	11.9666	-0.5766
4	4347.	18896409.	9.7500	10.9890	-1.2390
5	6068.	36820624.	10.0900	10.5366	-0.4466
6	8519.	72573361.	12.5200	11.6626	0.8574
7	11028.	121616784.	16.7100	14.9699	1.7401
8	13193.	187027624.	18.2600	19.5758	-1.3158

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.16698845E 02	0.12741010E 01	0.13106374E 02	0.09999999E 01	0.
-0.20661344E-02	0.46673521E-03	-0.44267806E 01	0.61047500E 04	0.46001182E-00
0.17313755E-06	0.32772372E-07	0.52830338E 01	0.54678398E 08	0.64092053E 00

RSQ =	0.8802
R =	0.9382
F(2, 5)=	18.3720
SUMUSQ =	8.5441
DURBIN-W.=	1.6630

WEST TEXAS OIL

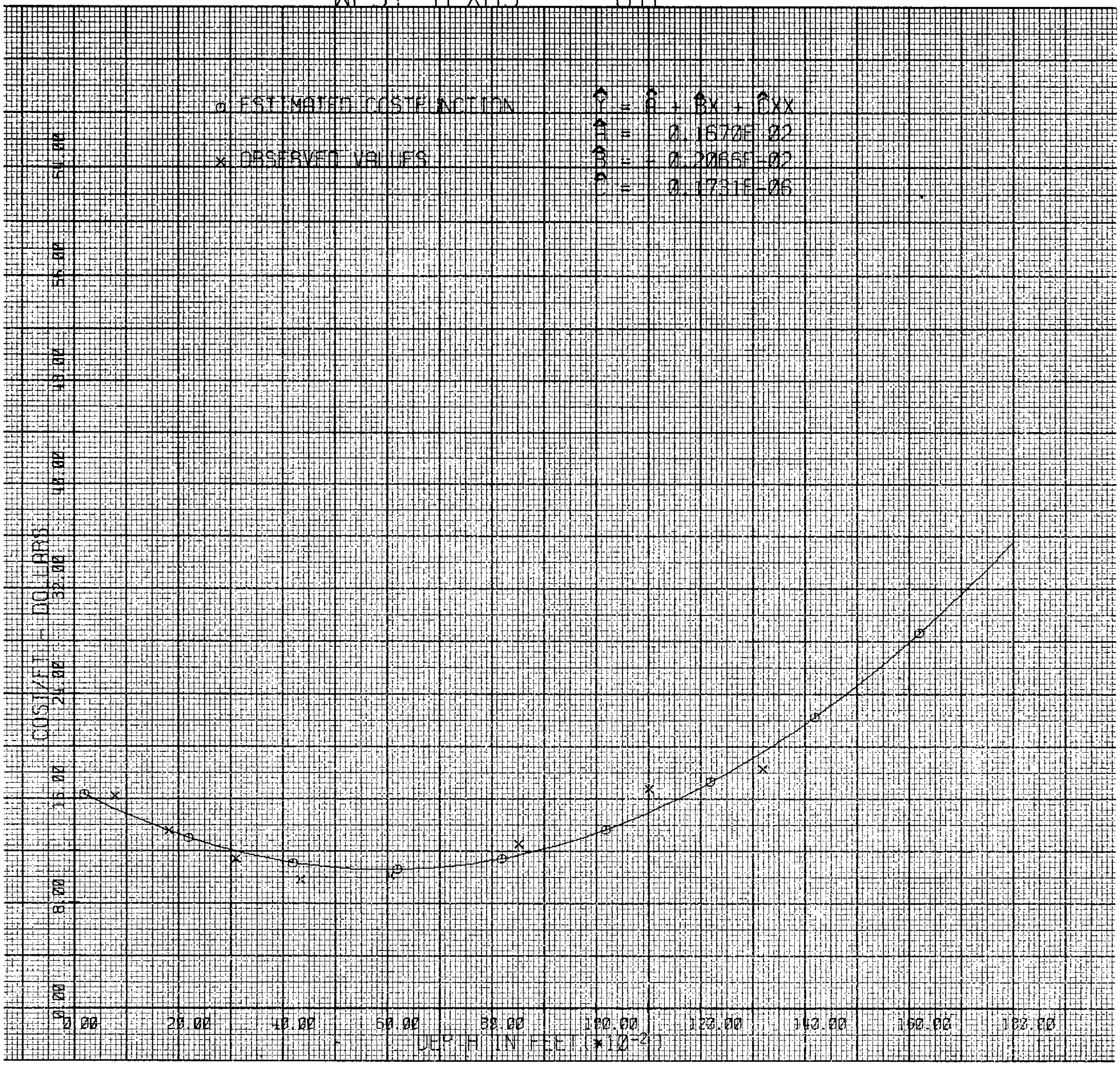


Table 48a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN WEST TEXAS

(in dollars)

```
DEPTH
 18000. feet
TOTAL COST
        14807.10000
        26520.20000
        36179.70000
        44822.39900
        53487.50000
        63213.59900
        75039.29900
        90003.19900
       109143.90000
       133500.00000
       164110.10000
       202012.80000
       248246.70000
       303850.40000
       369862.49000
       447321.60000
       537266.30000
       640735.19000
MINIMUM AVERAGE COST DEPTH
              5968. feet
MINIMUM MARGINAL COST DEPTH
              3978. feet
MARGINAL COST
            13.08730
            10.51320
             8.97770
             8.48080
             9.02250
            10.60280
            13.22170
            16.37920
            21.57530
            27.31000
            34.08330
            41.89520
            50.74570
            60.63480
            71.56250
            83.52880
            96.53370
           110.57720
POINT OF INFLECTION
        62871.68000
MINIMUM AVERAGE COST
            10.53542
MINIMUM MARGINAL COST
             8.48056
```

Table 49

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN WEST TEXAS

$\hat{Y} = 15.30 - 0.20(10^{-2})X_1 + 0.22(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	2236.	4999696.	12.0500	11.8298	0.2202
2	3455.	11937025.	10.7500	10.8507	-0.1007
3	4536.	20575296.	9.9800	10.5295	-0.5495
4	6776.	45914176.	12.8600	11.5002	1.3598
5	8917.	79512889.	12.3200	14.4914	-2.1714
6	12022.	72264242.	25.3200	22.4127	2.9073
7	14189.	100663860.	28.3700	30.4541	-2.0841
8	17007.	172309512.	44.4200	44.0016	0.4184

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.15325065E 02	0.26515328E 01	0.57797004E 01	0.09999999E 01	0.
-0.20550638E-02	0.68480874E-03	-0.30009310E 01	0.86422500E 04	0.91437023E 00
0.21998136E-06	0.35529834E-07	0.61914547E 01	0.99754166E 08	0.97314890E 00

RSQ =	0.9811
R =	0.9905
F(2, 5)=	129.6749
SUMUSQ =	19.8958
DURBIN-W.=	3.6887

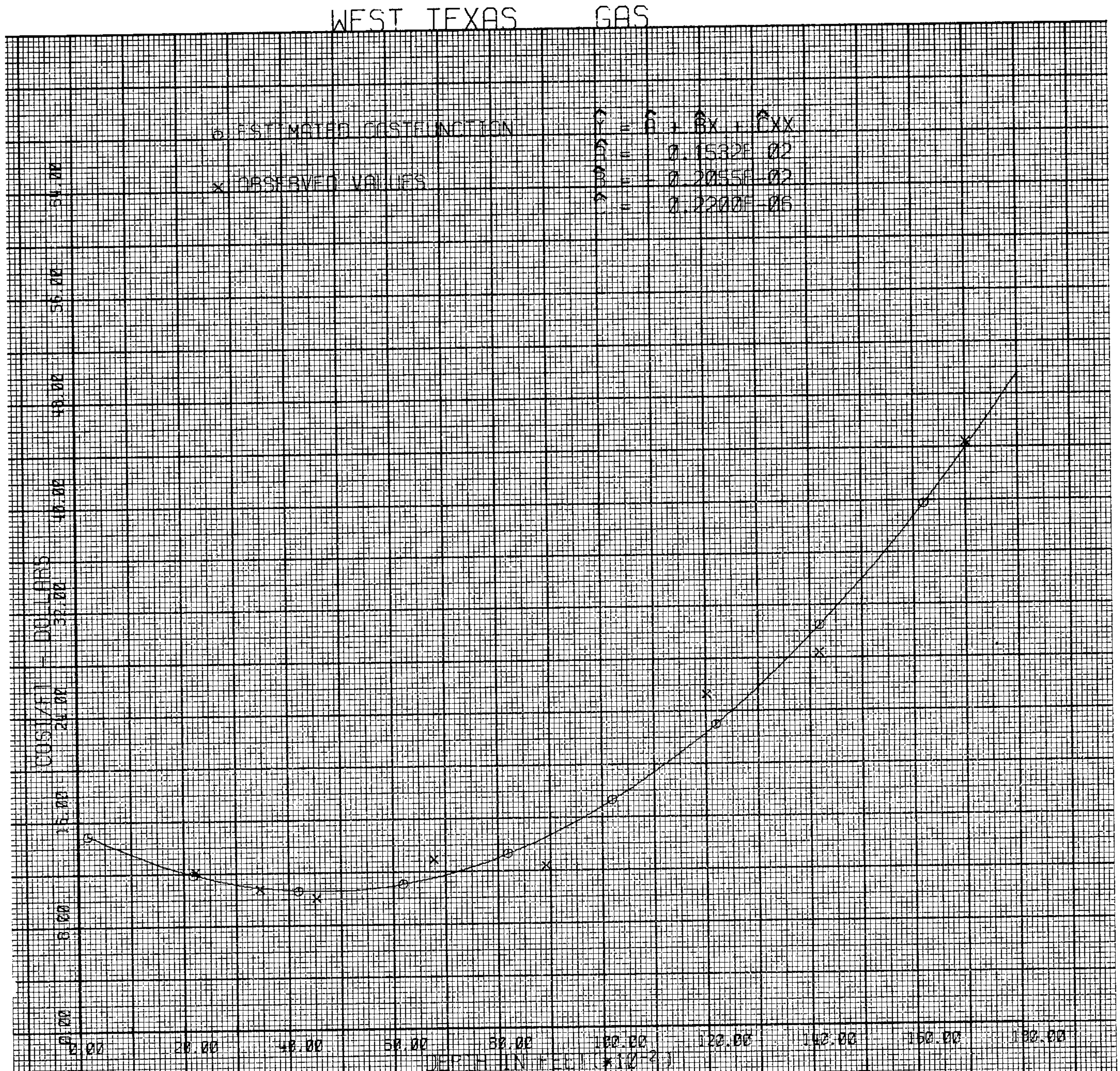

WEST TEXAS GAS
⊕ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1532E 02
B̂ = -0.2055E-02
Ĉ = 0.2300E-06
COST/FT - DOLLARS
DEPTH IN FEET (*10^-2)

Table 49a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN WEST TEXAS

(in dollars)

```
 DEPTH
  18000. feet
 TOTAL COST
         13485.00000
         24180.00000
         33405.00000
         42479.99900
         52725.00000
         65460.00000
         82004.99900
        103680.00000
        131805.00000
        167700.00000
        212685.00000
        268080.00000
        335205.00000
        415379.99000
        509925.00000
        620160.00000
        747405.01000
        892980.01000
MINIMUM AVERAGE COST DEPTH
              4670. feet
MINIMUM MARGINAL COST DEPTH
              3114. feet
MARGINAL COST
           11.87000
            9.74000
            8.93000
            9.44000
           11.27000
           14.42000
           18.89000
           24.68000
           31.79000
           40.22000
           49.97000
           61.04000
           73.43000
           87.14000
          102.17000
          118.52000
          136.19000
          155.18000
POINT OF INFLECTION
        49138.35600
MINIMUM AVERAGE COST
           10.52111
MINIMUM MARGINAL COST
            8.92148
```

Table 50

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN WEST TEXAS

$$\hat{Y} = 18.90 - 0.33(10^{-2})X_1 + 0.29(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	858.	736164.	17.1900	16.2994	0.8906
2	1829.	3345241.	14.8700	13.8347	1.0353
3	3081.	9492561.	11.5700	11.4622	0.1078
4	3081.	9492561.	8.5000	11.4622	-2.9622
5	4337.	18809569.	9.0500	9.9939	-0.9439
6	6163.	37982569.	11.0100	9.4879	1.5221
7	8717.	75986089.	13.2900	12.0180	1.2720
8	11109.	123409881.	16.8900	17.8116	-0.9216

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.18931539E 02	0.19727010E 01	0.95967602E 01	0.09999999E 01	0.
-0.33160336E-02	0.83445264E-03	-0.39739027E 01	0.48968749E 04	0.15852749E-00
0.28942508E-06	0.67793738E-07	0.42692008E 01	0.34906829E 08	0.35679197E-00

RSQ =	0.7901
R =	0.8889
F(2, 5)=	9.4124
SUMUSQ =	16.3264
DURBIN-W.=	1.5518

WEST TEXAS DRY

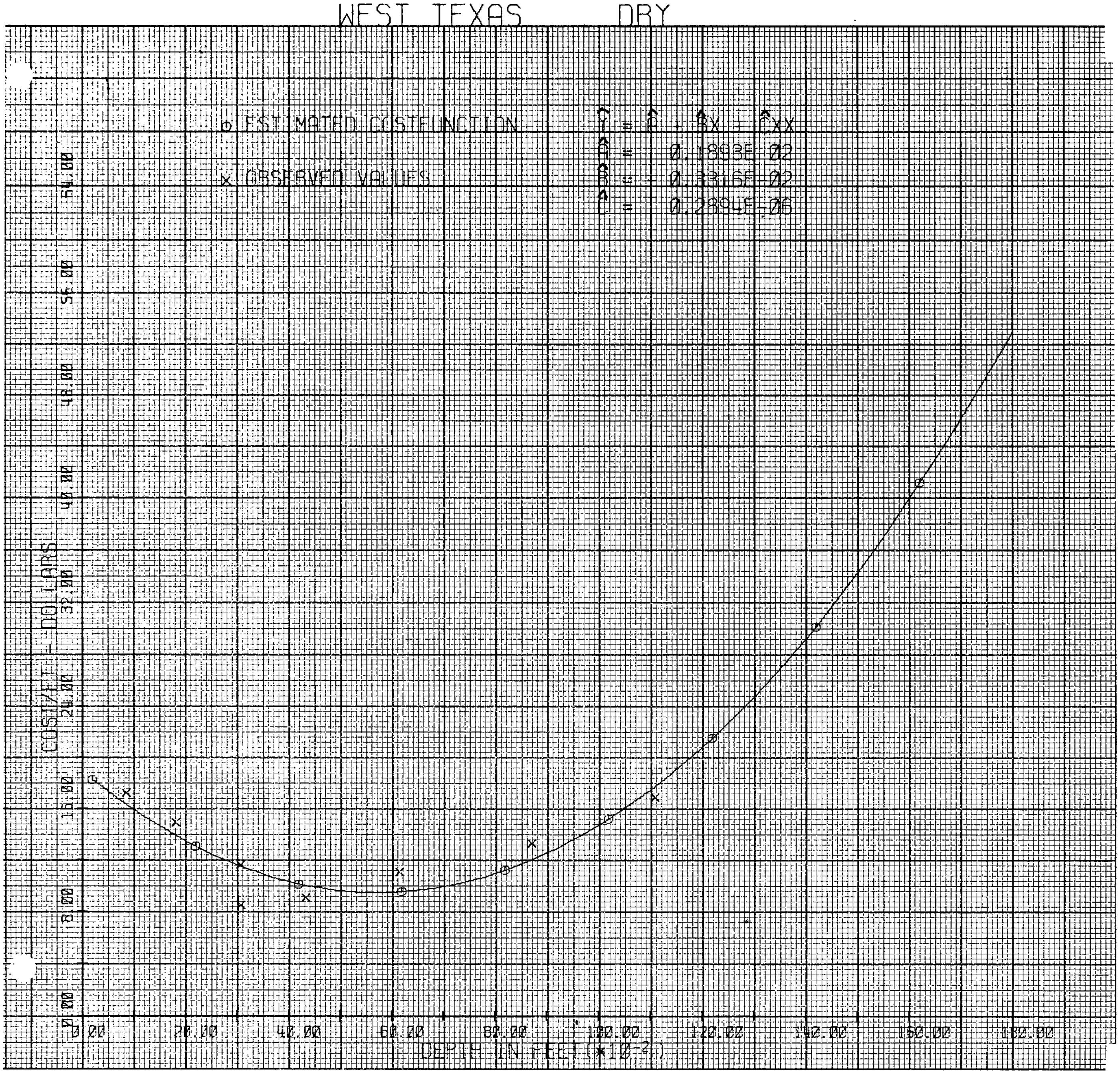


Table 50a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN WEST TEXAS

(in dollars)

```
  DEPTH
   18000. feet
 TOTAL COST
        15903.40000
        26911.20000
        34759.80000
        41185.60100
        47925.00000
        56714.40000
        69290.20000
        87388.79900
       112746.60000
       147100.00000
       192185.40000
       249739.20000
       321497.80000
       409197.59000
       514574.99000
       639366.39000
       785308.21000
       954136.80000
MINIMUM AVERAGE COST DEPTH
             5729. feet
MINIMUM MARGINAL COST DEPTH
             3819. feet
MARGINAL COST
          13.16620
           9.13880
           6.84780
           6.29320
           7.47500
          10.39320
          15.04780
          21.43880
          29.56620
          39.43000
          51.03020
          64.36680
          79.43980
          96.24920
         114.79500
         135.07720
         157.09580
         180.85080
POINT OF INFLECTION
        54032.01500
MINIMUM AVERAGE COST
           9.43116
MINIMUM MARGINAL COST
           6.26488
```

Table 51

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN UTAH

$$\hat{Y} = 23.30 - 0.38(10^{-2})X_1 + 0.37(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	777.	603729.	21.3500	20.5814	0.7686
2	1774.	3147076.	18.1800	17.7686	0.4114
3	2962.	8773444.	13.0900	15.3790	-2.2890
4	4346.	18887716.	13.8600	13.9146	-0.0546
5	5923.	35081929.	15.3400	13.9767	1.3633
6	11940.	171281800.	30.9500	31.1497	-0.1997

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.23284450E 02	0.17530668E 01	0.13282123E 02	0.09999999E 01	0.
-0.37668142E-02	0.73519441E-03	-0.51235621E 01	0.46203333E 04	0.64832935E 00
0.37064882E-06	0.54537104E-07	0.67962687E 01	0.34842915E 08	0.80950232E 00

RSQ =	0.9646
R =	0.9822
F(2, 3)=	40.9288
SUMUSQ =	7.9011
DURBIN-W.=	2.1347

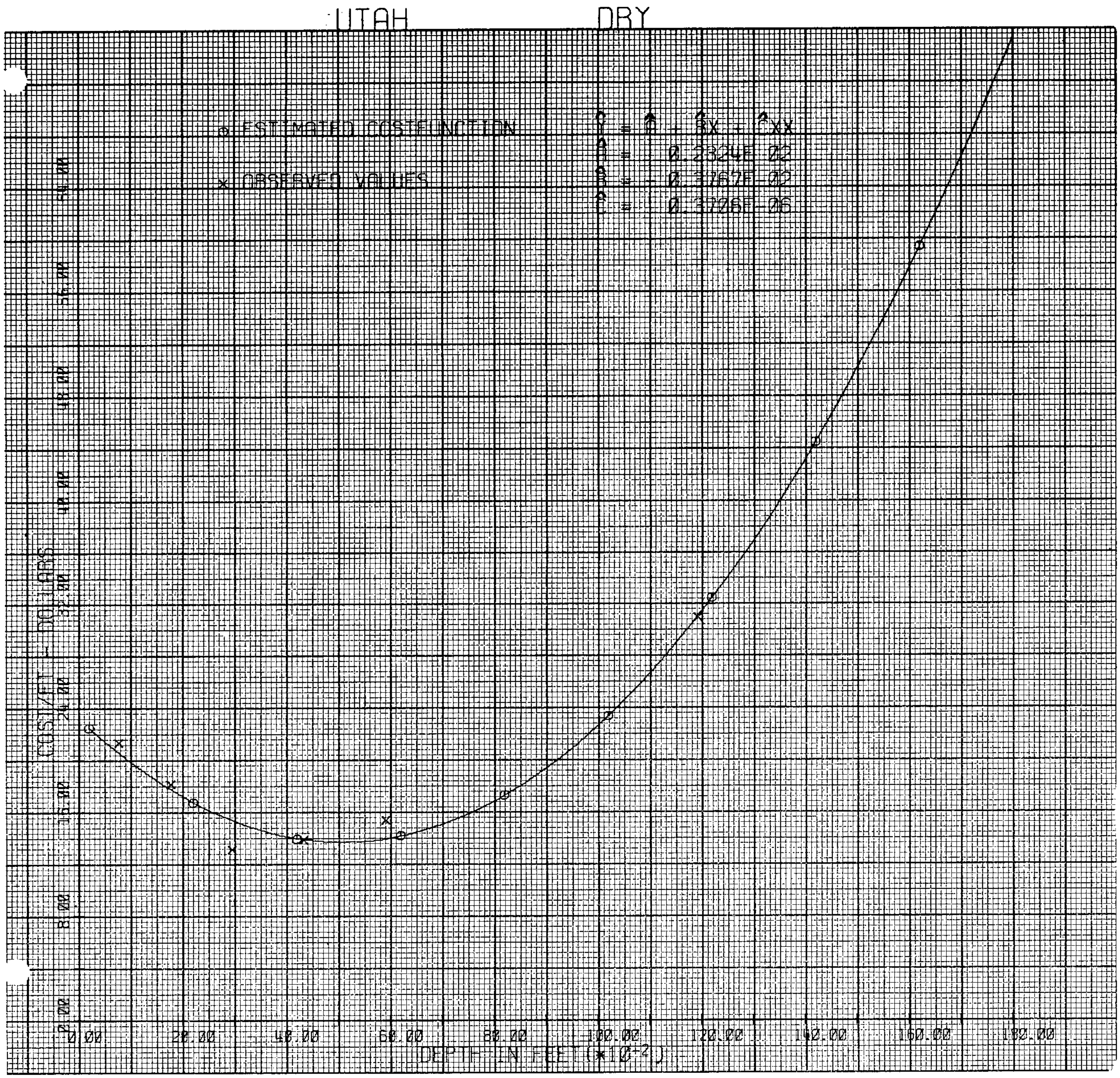

UTAH DRY
⊙ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.2324E 02
B̂ = -0.3767E-02
Ĉ = 0.3706E-06
COST/FT - DOLLARS
DEPTH IN FEET (*10^2)

Table 51a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN UTAH

(in dollars)

```
DEPTH
  18000. feet
TOTAL COST
        19843.60000
        34376.80000
        45823.20000
        56406.40100
        68350.00100
        83877.60100
       105212.80000
       134579.20000
       174200.40000
       226300.00000
       293101.60000
       376828.81000
       479705.20000
       603954.40000
       751800.00000
       925465.61000
      1127174.80000
      1359151.20000
MINIMUM AVERAGE COST DEPTH
              5082. feet
MINIMUM MARGINAL COST DEPTH
              3388. feet
MARGINAL COST
           16.81780
           12.61920
           10.64420
           10.89280
           13.36500
           18.06080
           24.98020
           34.12320
           45.48980
           59.08000
           74.89380
           92.93120
          113.19220
          135.67680
          160.38500
          187.31680
          216.47220
          247.85120
POINT OF INFLECTION
        69462.27200
MINIMUM AVERAGE COST
           13.66749
MINIMUM MARGINAL COST
           10.47665
```

Table 52

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN WYOMING

$\hat{Y} = 6.30 + 0.15(10^{-2})\ X$

Where:

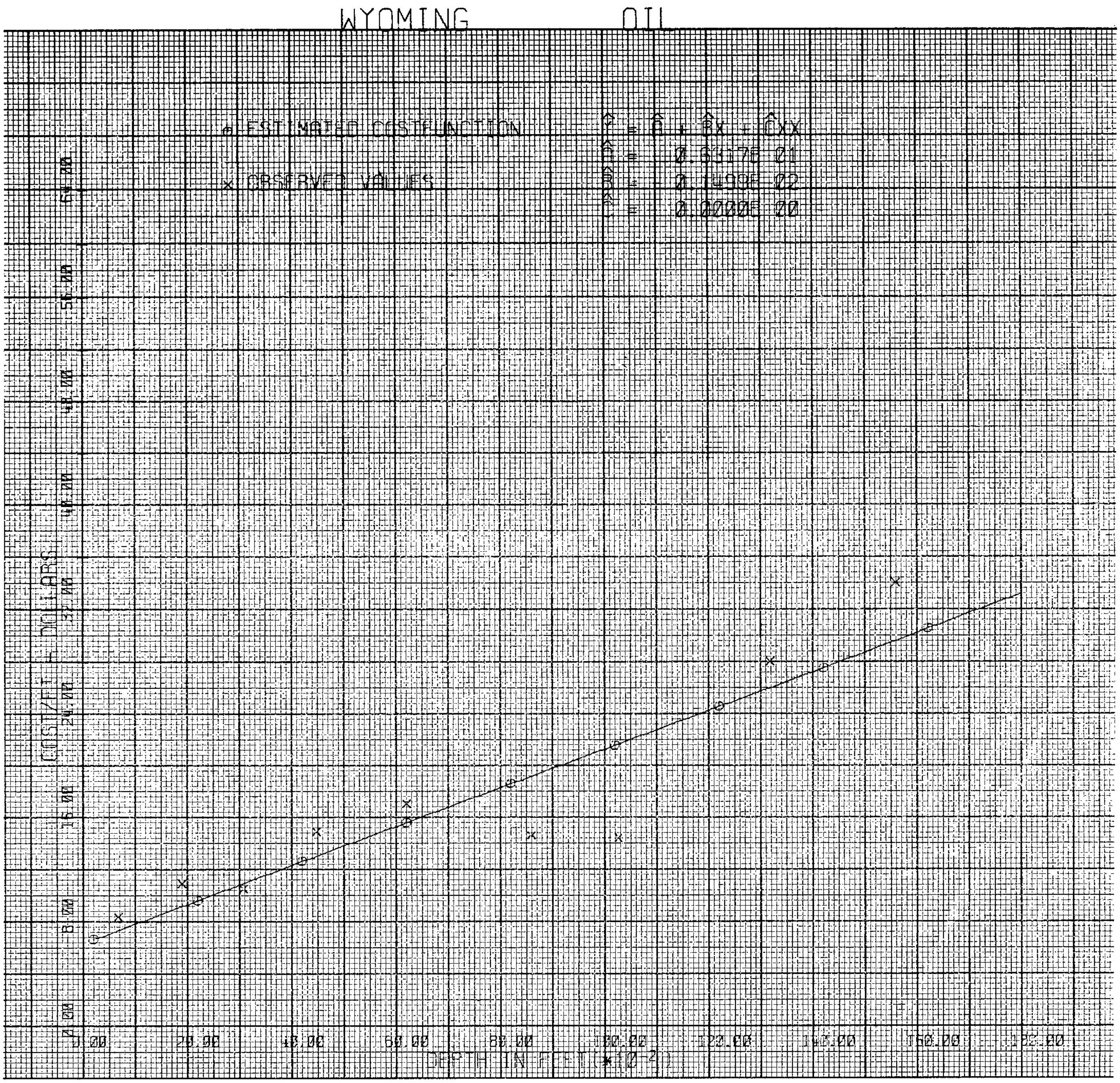
$\hat{Y}$ = Estimated drilling cost per foot

X = Depth

SAMPLE NUMBER	OBSERVED VALUES X	OBSERVED VALUES Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
3	671.	10.4700	10.9386	-0.4686
4	1891.	14.8800	13.0283	1.8517
5	3083.	17.0600	15.5991	1.4609
6	4473.	14.6000	19.2028	-4.6028
7	6192.	14.4300	21.7122	-7.2822
8	8596.	28.0700	26.0834	1.9866
9		34.0700	29.6811	4.3889

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.63170613E 01	0.23048520E 01	0.27407665E 01	0.09999999E 01	0.
0.14990374E-02	0.26751748E-03	0.56035120E 01	0.71057778E 04	0.90427058E 00

```
     RSQ =    0.8177
       R =    0.9043
F( 1,  7)=   31.3993
  SUMUSQ =  107.0273
DURBIN-W.=    1.3678
```



WYOMING OIL
⊕ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
$\hat{Y} = \hat{A} + \hat{B}X + \hat{C}XX$
$\hat{A}$ = 0.6317E 01
$\hat{B}$ =
$\hat{C}$ = 0.0000E 00
COST/FT - DOLLARS
DEPTH IN FEET (*10 2)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00

Table 53

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN WYOMING

$\hat{Y} = 25.95 - 0.35(10^{-2})X_1 + 0.36(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	442.	195364.	25.0000	24.4764	0.5236
2	1778.	3161284.	19.4600	20.8602	-1.4002
3	3029.	9174841.	20.0200	18.6270	1.3930
4	4346.	18887716.	16.3800	17.4809	-1.1009
5	6586.	43375396.	19.7200	18.3700	1.3500
6	8708.	75829264.	21.4900	22.5098	-1.0198
7	11062.	122367844.	31.1100	30.8558	0.2542

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.25952718E 02	0.13987689E 01	0.18553971E 02	0.09999999E 01	0.
-0.34976043E-02	0.60722432E-03	-0.57599871E 01	0.51358571E 04	0.46795885E-00
0.35625020E-06	0.51235718E-07	0.69531612E 01	0.38998815E 08	0.66731428E 00

RSQ =	0.9403
R =	0.9697
F(2, 4)=	31.5118
SUMUSQ =	8.3141
DURBIN-W.=	3.7247

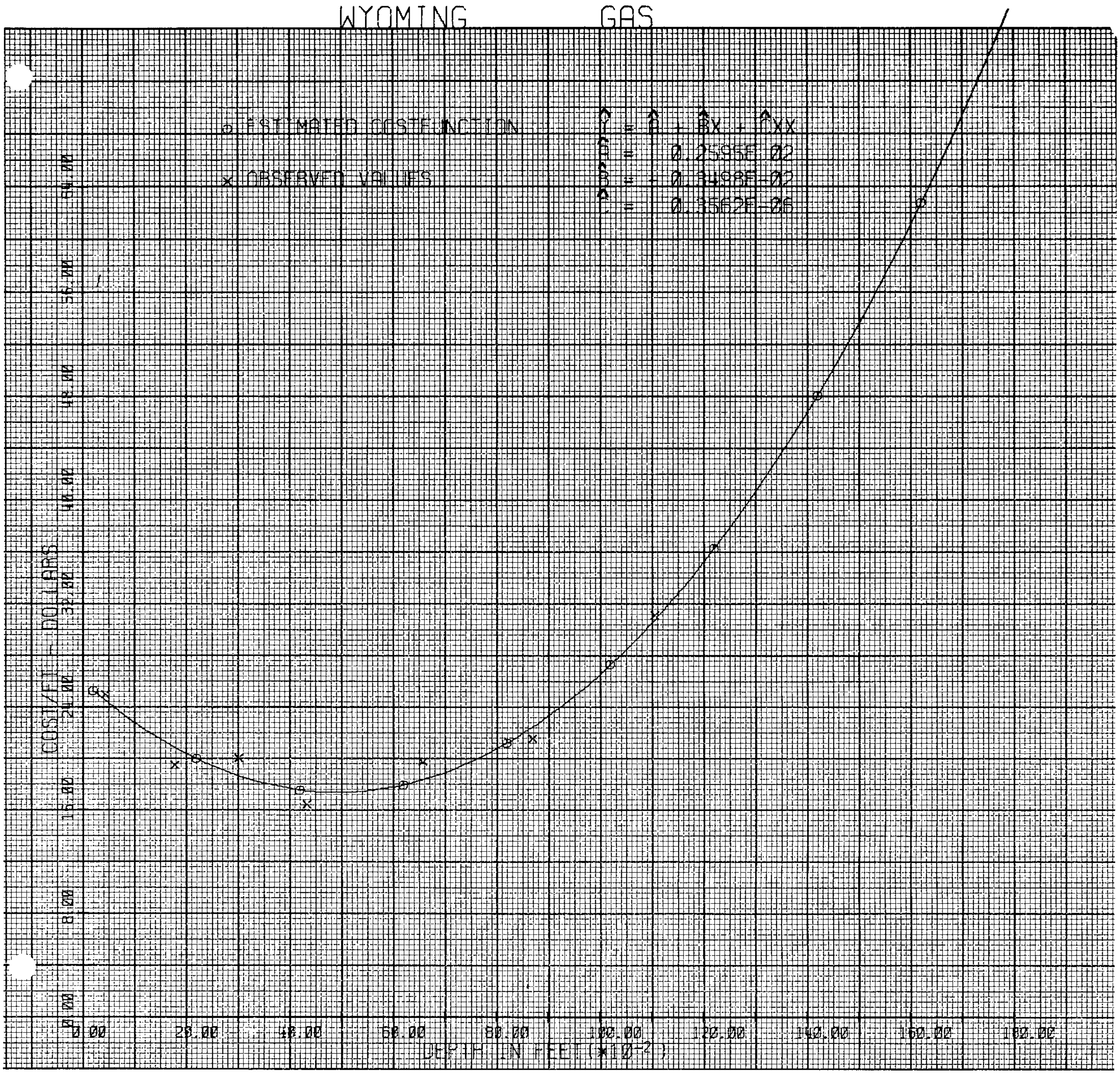

WYOMING GAS
○ ESTIMATED COST FUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.2595E 02
B̂ = -0.3498E-02
Ĉ = 0.3562E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (×10⁻²)

Table 53a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN WYOMING

(in dollars)

```
DEPTH
  18000. feet
TOTAL COST
        22803.20000
        40757.60000
        55985.40100
        70628.80000
        86825.00000
       106711.20000
       132424.60000
       166102.40000
       209881.80000
       265900.00000
       336294.20000
       423201.61000
       528759.40000
       655104.80000
       804375.00000
       978707.21000
      1180238.60000
      1411106.40000
MINIMUM AVERAGE COST DEPTH
              4910. feet
MINIMUM MARGINAL COST DEPTH
              3273. feet
MARGINAL COST
           20.02260
           16.23240
           14.57940
           15.06360
           17.68500
           22.44360
           29.33940
           38.37240
           49.54260
           62.85000
           78.29460
           95.87640
          115.59540
          137.45160
          161.44500
          187.57560
          215.84340
          246.24840
POINT OF INFLECTION
        85250.86200
MINIMUM AVERAGE COST
           17.36213
MINIMUM MARGINAL COST
           14.49950
```

Table 54

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN WYOMING

$$\hat{Y} = 19.15 - 0.33(10^{-2})X_1 + 0.25(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

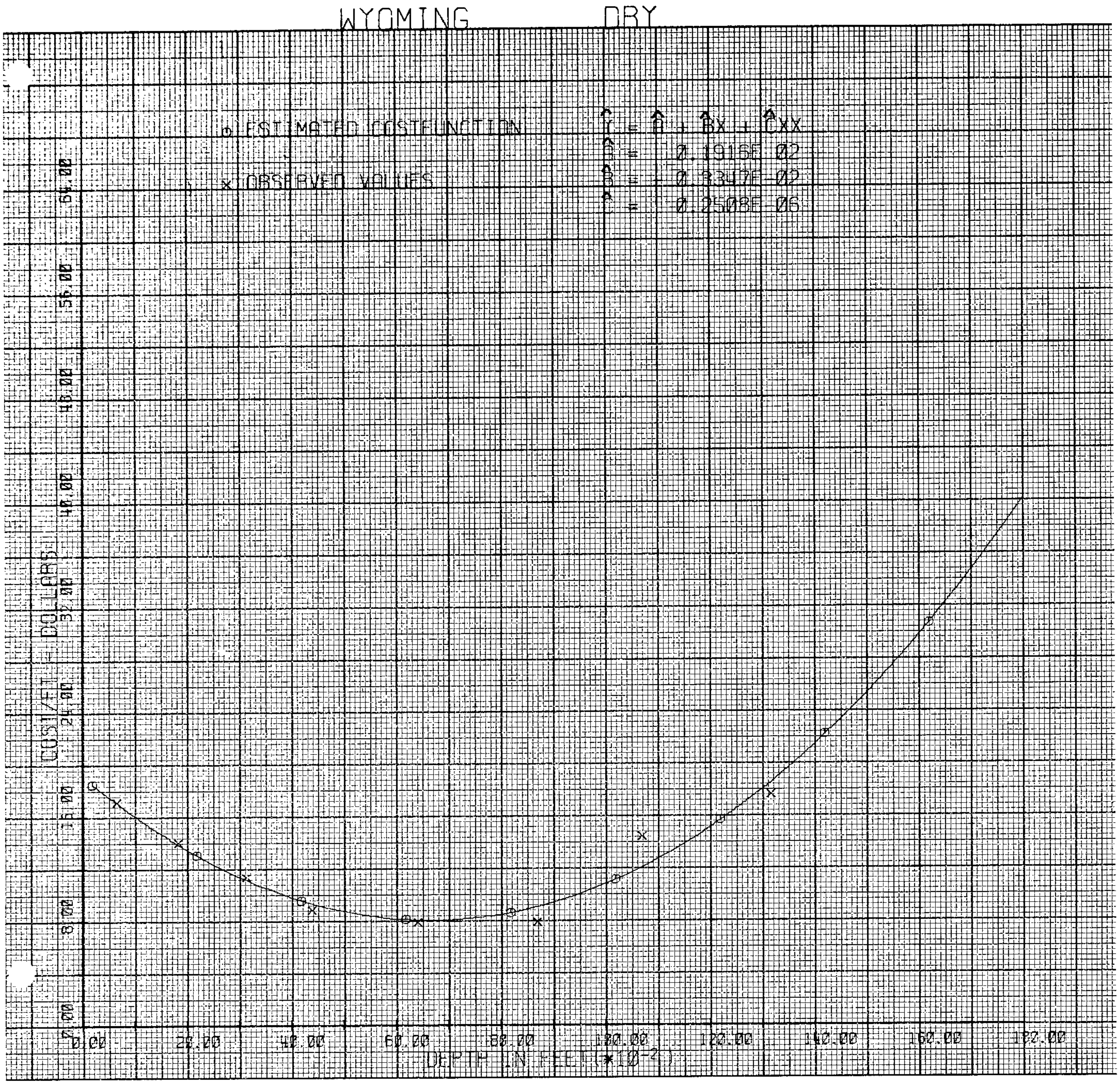
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	655.	429025.	17.1500	17.0730	0.0770
2	1847.	3411409.	14.0100	13.8312	0.1788
3	3148.	9909904.	11.3200	11.1066	0.2134
4	4396.	19324816.	8.7900	9.2908	-0.5008
5	6413.	41126569.	7.8100	8.0079	-0.1979
6	8701.	75707401.	7.8600	9.0231	-1.1631
7	10695.	114383025.	14.4000	12.0494	2.3506
8	13154.	186513858.	17.5700	18.5279	-0.9579

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19157694E 02	0.12138972E 01	0.15781973E 02	0.09999999E 01	0.
-0.33470983E-02	0.44354088E-03	-0.75463130E 01	0.61261250E 04	0.73119218E-01
0.25081490E-06	0.31591156E-07	0.79394025E 01	0.54664983E 08	0.30715182E-00

RSQ =	0.9269
R =	0.9628
F(2, 5)=	31.6999
SUMUSQ =	8.1690
DURBIN-W.=	3.0404



WYOMING DRY
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1916E 02
B̂ = -0.3347E-02
Ĉ = 0.2508E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10^-2)

Table 54a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN WYOMING

(in dollars)

```
 DEPTH
  18000. feet
 TOTAL COST
        16063.80000
        26938.40000
        34128.60100
        39139.20100
        43475.00100
        48640.80200
        56141.40100
        67481.60200
        84166.20300
       107700.00000
       139587.80000
       181334.41000
       234444.60000
       300423.20000
       380775.01000
       477004.81000
       590617.42000
       723117.63000
MINIMUM AVERAGE COST DEPTH
              6673. feet
MINIMUM MARGINAL COST DEPTH
              4448. feet
MARGINAL COST
            13.21840
             8.78160
             5.84960
             4.42240
             4.50000
             6.08240
             9.16960
            13.76160
            19.85840
            27.46000
            36.56640
            47.17760
            59.29360
            72.91440
            88.04000
           104.67040
           122.80560
           142.44560
POINT OF INFLECTION
        53336.63600
MINIMUM AVERAGE COST
             7.99332
MINIMUM MARGINAL COST
             4.27110
```

ESTIMATED DRILLING COST FUNCTIONS PER GEOLOGICAL REGION

Includes Average Drilling Estimated Cost Functions (Tables 55 to 63 and their Corresponding Figures) and Total and Marginal Costs (Tables 55.a to 63.a).

Table 55

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN REGION I (Carbon-Permian)

$$\hat{Y} = 8.30 - 0.57(10^{-3})X_1 + 0.14(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1137.	1292769.	8.2300	7.8313	0.3987
2	2373.	5631129.	5.7000	7.7366	-2.0366
3	3530.	12460900.	5.6600	8.0416	-2.3816
4	4777.	22819729.	6.9900	8.7965	-1.8065
5	6799.	46226401.	9.2600	10.9605	-1.7005
6	785.	616225.	7.1300	7.9377	-0.8077
7	1748.	3055504.	7.5600	7.7302	-0.1702
8	2911.	8473921.	8.7300	7.8311	0.8989
9	881.	776161.	8.6300	7.9052	0.7248
10	1908.	3640464.	8.7400	7.7212	1.0188
11	3115.	9703225.	10.3800	7.8884	2.4916
12	4401.	19368801.	11.3900	8.5223	2.8677
13	6504.	42302016.	11.6800	10.5723	1.1077
14	8718.	76003524.	12.4900	14.0895	-1.5995
15	11119.	123632161.	20.1800	19.4791	0.7009
16	825.	680625.	6.4000	7.9239	-1.5239
17	1792.	3211264.	6.4600	7.7270	-1.2670
18	3038.	9229444.	7.0700	7.8654	-0.7954
19	4320.	18662400.	8.0700	8.4685	-0.3985
20	6095.	37149025.	9.5400	10.0751	-0.5351
21	8546.	73034116.	11.5400	13.7663	-2.2263
22	836.	698896.	7.8200	7.9201	-0.1001
23	1819.	3308761.	5.0600	7.7253	-2.6653
24	3019.	9114361.	13.5000	7.8599	5.6401
25	870.	756900.	8.0100	7.9088	0.1012
26	1881.	3538161.	7.9200	7.7222	0.1978
27	3127.	9778129.	8.0900	7.8922	0.1978
28	4369.	19088161.	9.0100	8.5009	0.5091
29	6012.	36144144.	11.2800	9.9801	1.2999
30	933.	870489.	7.6600	7.8887	-0.2287
31	3085.	9517225.	8.4600	7.8792	0.5808
32	13465.	190653112.	27.1600	26.3286	0.8314
33	1836.	3370896.	8.4000	7.7244	0.6756

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.83020014E 01	0.73831981E 00	0.11244451E 02	0.09999999E 01	0.
-0.57566073E-03	0.32132816E-03	-0.17915041E 01	0.38355757E 04	0.82580031E 00
0.14217852E-06	0.25532837E-07	0.55684574E 01	0.24104913E 08	0.90932264E 00

```
      RSQ =    0.8436
        R =    0.9185
F( 2, 30)=    80.9078
   SUMUSQ =   90.3551
DURBIN-W.=     1.6571
```

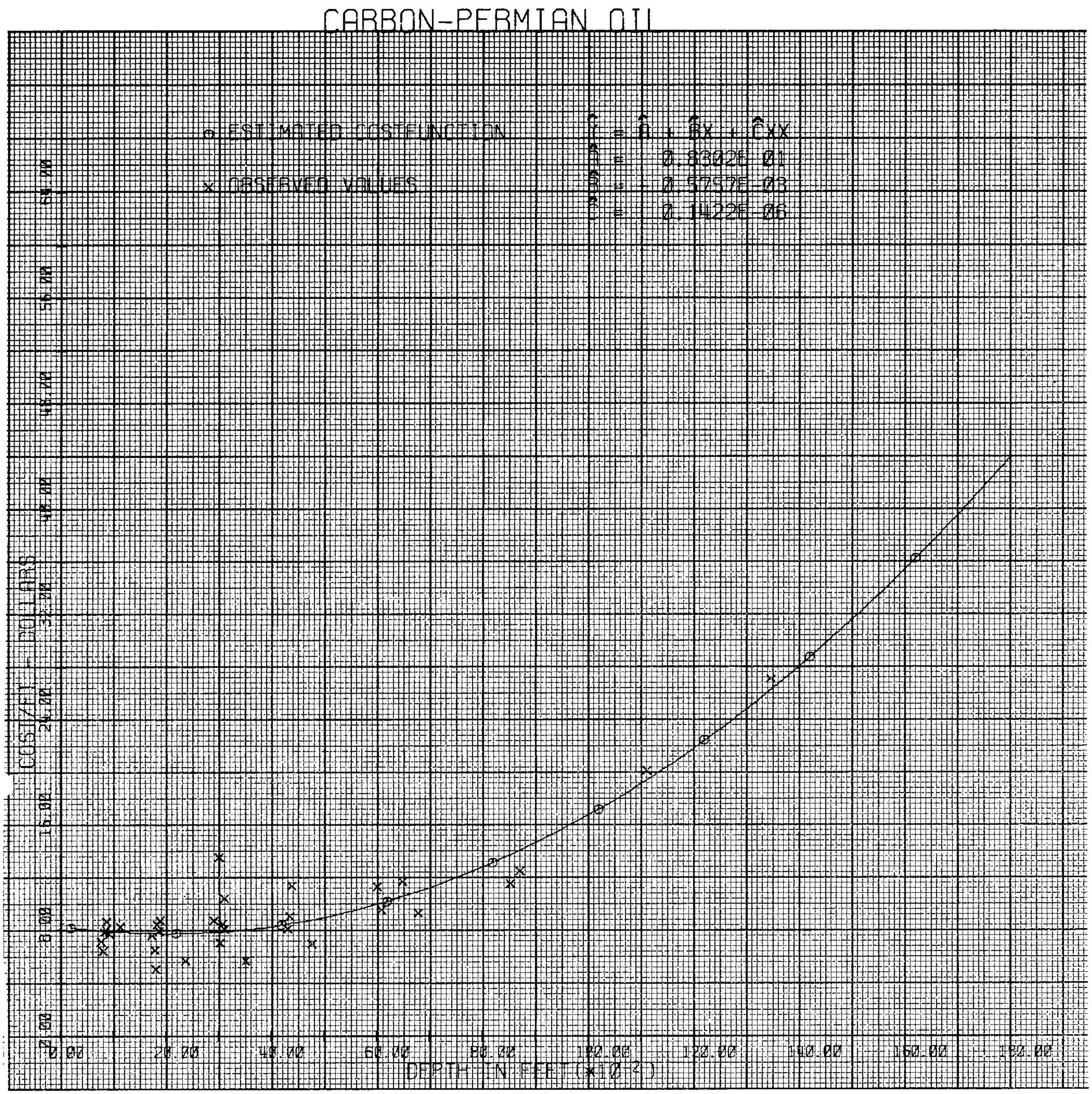

CARBON-PERMIAN OIL
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.8302E 01
B̂ = - 0.5757E-03
Ĉ = 0.1422E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10 2)

Table 55a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN REGION I

(Carbon Permian)

(in dollars)

```
 DEPTH
  18000. feet
 TOTAL COST
          7868.49990
         15438.80000
         23564.10100
         33097.60000
         44892.50100
         59802.00100
         78679.30100
        102377.60000
        131750.10000
        167650.00000
        210930.50000
        262444.80000
        323046.10000
        393587.60000
        474922.50000
        567904.00000
        673385.31000
        792219.61000
MINIMUM AVERAGE COST DEPTH
             2024. feet
MINIMUM MARGINAL COST DEPTH
             1350. feet
MARGINAL COST
             7.57720
             7.70560
             8.68720
            10.52200
            13.21000
            16.75120
            21.14560
            26.39320
            32.49400
            39.44800
            47.25520
            55.91560
            65.42920
            75.79600
            87.01600
            99.08920
           112.01560
           125.79520
POINT OF INFLECTION
       15625.91600
MINIMUM AVERAGE COST
             7.71932
MINIMUM MARGINAL COST
             7.52509
```

Table 56

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN REGION I (Carbon-Permian)

$$\hat{Y} = 13.50 - 0.16(10^{-2})X_1 + 0.19(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

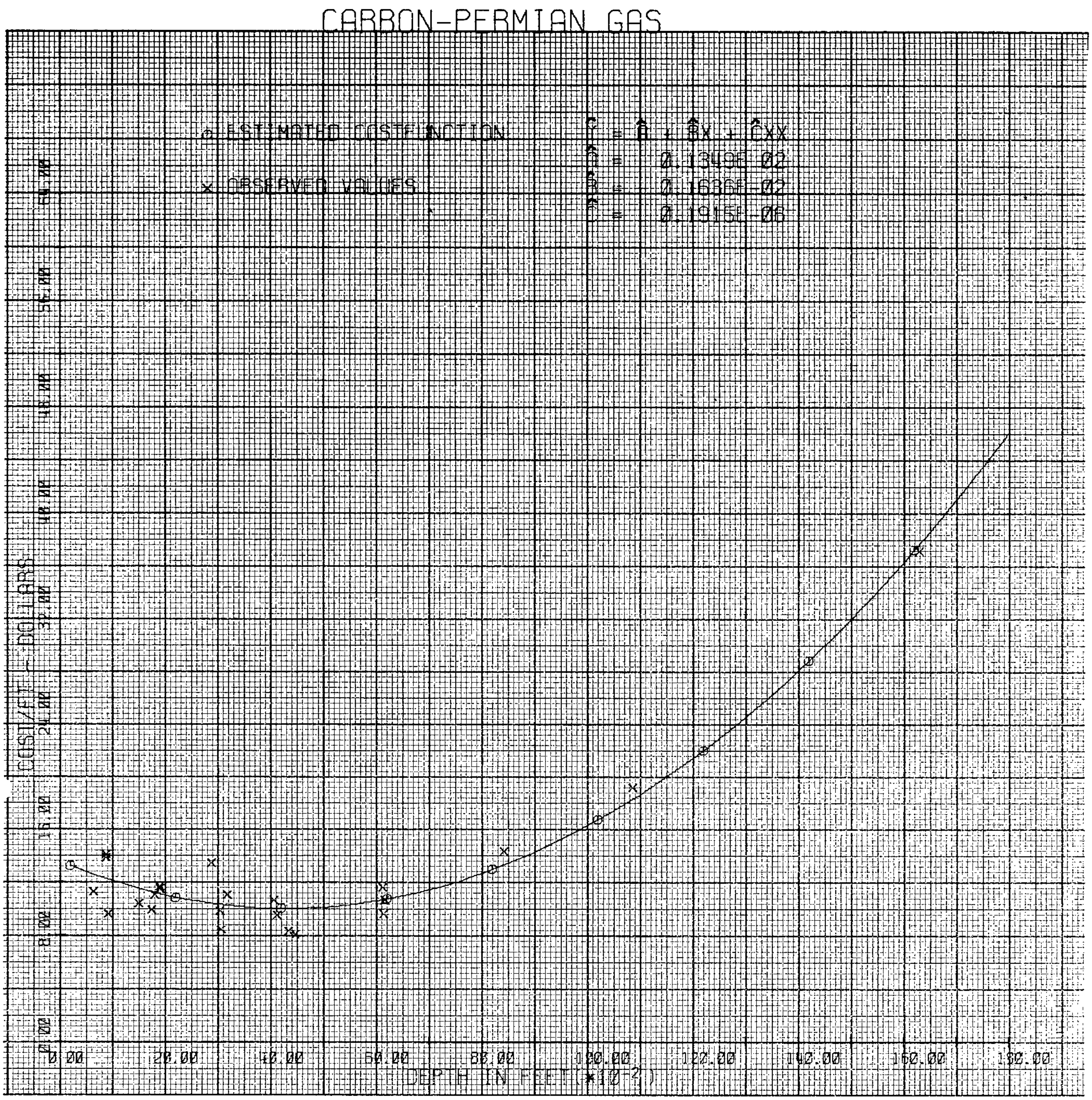
X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	648.	419904.	11.3000	12.5072	-1.2072
2	1504.	2262016.	10.3700	11.4589	-1.0889
3	2878.	8282884.	13.4700	10.3631	3.1069
4	4116.	16941456.	9.5200	9.9949	-0.4749
5	6114.	37380996.	11.6300	10.6387	0.9913
6	8413.	70778569.	14.3500	13.2710	1.0790
7	10857.	117874449.	19.2400	18.2889	0.9511
8	16296.	132779808.	37.1800	37.6657	-0.4857
9	882.	777924.	13.8500	12.1927	1.6573
10	1807.	3265249.	11.0300	11.1552	-0.1252
11	3069.	9418761.	8.4400	10.2680	-1.8280
12	4337.	18809569.	8.3200	9.9909	-1.6709
13	6141.	37711881.	9.6100	10.6579	-1.0479
14	920.	846400.	9.6000	12.1437	-2.5437
15	1735.	3010225.	9.9400	11.2242	-1.2842
16	4470.	19980900.	8.0700	9.9975	-1.9275
17	6156.	37896336.	10.6400	10.6686	-0.0286
18	887.	786769.	14.1000	12.1863	1.9137
19	1909.	3644281.	11.5000	11.0608	0.4392
20	3182.	10125124.	11.0700	10.2183	0.8517
21	4066.	16532356.	10.6200	9.9984	0.6216
22	887.	786769.	14.1200	12.1863	1.9337
23	1897.	3598609.	11.6800	11.0717	0.6083
24	3041.	9247681.	9.8400	10.2811	-0.4411

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.13487265E 02	0.67202146E 00	0.20069694E 02	0.09999999E 01	0.
-0.16365980E-02	0.25654092E-03	-0.63794811E 01	0.40088333E 04	0.74305878E 00
0.19147660E-06	0.16476230E-07	0.11621384E 02	0.28997445E 08	0.90715762E 00

RSQ = 0.9397
R = 0.9694
F(2, 21)= 163.7232
SUMUSQ = 46.9091
DURBIN-W.= 1.3721



CARBON-PERMIAN GAS
○ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = Ø.1349E Ø2
B̂ = Ø.1636E-Ø2
Ĉ = Ø.1915E-Ø6
COST/FT - DOLLARS
Ø.ØØ
8.ØØ
16.ØØ
24.ØØ
32.ØØ
4Ø.ØØ
48.ØØ
56.ØØ
64.ØØ
Ø.ØØ
2Ø.ØØ
4Ø.ØØ
6Ø.ØØ
8Ø.ØØ
1ØØ.ØØ
12Ø.ØØ
14Ø.ØØ
16Ø.ØØ
18Ø.ØØ
DEPTH IN FEET(*1Ø⁻²)

Table 56a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN REGION I

(Carbon Permian)

(in dollars)

```
  DEPTH
   18000.feet
 TOTAL COST
         12045.50000
         21968.00000
         30916.50000
         40040.00000
         50487.50100
         63408.00100
         79950.50100
        101264.00000
        128497.50000
        162800.00000
        205320.50000
        257208.00000
        319611.50000
        393680.00000
        480562.51000
        581408.01000
        697365.51000
        829584.01000
MINIMUM AVERAGE COST DEPTH
              4272.feet
MINIMUM MARGINAL COST DEPTH
              2848.feet
MARGINAL COST
            10.79250
             9.24400
             8.84450
             9.59400
            11.49250
            14.54000
            18.73650
            24.08200
            30.57650
            38.22000
            47.01250
            56.95400
            68.04450
            80.28400
            93.67250
           108.21000
           123.89650
           140.73200
POINT OF INFLECTION
        42697.80600
MINIMUM AVERAGE COST
            9.99588
MINIMUM MARGINAL COST
            8.83117
```

Table 57

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN REGION I (Carbon-Permian)

$$\hat{Y} = 6.90 - 0.11(10^{-2})X_1 + 0.18(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE	OBSERVED VALUES			ESTIMATED VALUES	RESIDUAL
NUMBER	X_1	X_2	Y	$\hat{Y}$	$Y - \hat{Y}$
1	2102.	4418404.	5.8200	5.4808	0.3392
2	3315.	10989225.	4.4900	5.3973	-0.9073
3	4584.	21013056.	4.8300	5.8866	-1.0566
4	6679.	44609041.	6.3500	7.9846	-1.6346
5	8760.	76737600.	9.4500	11.6594	-2.2094
6	11780.	69384200.	17.6400	19.8126	-2.1726
7	830.	688900.	7.0500	6.1470	0.9030
8	1829.	3345241.	6.5500	5.5739	0.9761
9	3069.	9418761.	6.5200	5.3707	1.1493
10	4338.	18818244.	7.1600	5.7457	1.4143
11	6157.	37908649.	11.2000	7.3115	3.8885
12	888.	788544.	7.4200	6.1037	1.3163
13	1873.	3508129.	6.7100	5.5570	1.1530
14	3167.	10029889.	7.0200	5.3787	1.6413
15	4414.	19483396.	7.4500	5.7869	1.6631
16	6351.	40335201.	8.5800	7.5500	1.0300
17	8753.	76615009.	11.4700	11.6444	-0.1744
18	11095.	123099025.	15.6500	17.6705	-2.0205
19	13686.	193653298.	34.0000	26.6771	7.3229
20	16509.	268136770.	37.3900	39.2882	-1.8982
21	820.	672400.	5.0500	6.1546	-1.1046
22	1787.	3193369.	4.5600	5.5906	-1.0306
23	3039.	9235521.	5.4500	5.3690	0.0810
24	4300.	18490000.	5.6600	5.7259	-0.0659
25	6099.	37197801.	6.0900	7.2429	-1.1529
26	8606.	74063236.	7.5700	11.3331	-3.7631
27	816.	665856.	5.9000	6.1576	-0.2576
28	1814.	3290596.	5.4300	5.5798	-0.1498
29	3028.	9168784.	6.4600	5.3684	1.0916
30	4171.	17397241.	7.7500	5.6627	2.0873
31	979.	958441.	4.3100	6.0383	-1.7283
32	1897.	3598609.	5.7400	5.5481	0.1919
33	3152.	9935104.	4.9300	5.3772	-0.4472
34	4385.	19228225.	5.2800	5.7709	-0.4909
35	6000.	36000000.	7.1700	7.1286	0.0414
36	840.	705600.	4.2800	6.1394	-1.8594
37	1780.	3168400.	4.8100	5.5934	-0.7834
38	2996.	8976016.	5.8700	5.3671	0.5029
39	748.	559504.	5.7900	6.2103	-0.4203
40	1671.	2792241.	4.9400	5.6402	-0.7002
41	2923.	8543929.	4.6000	5.3654	-0.7654

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.69010858E 01	0.69677698E 00	0.99042965E 01	0.09999999E 01	0.
-0.10604930E-02	0.25980275E-03	-0.40819161E 01	0.44397561E 04	0.84413901E 00
0.18306846E-06	0.17314141E-07	0.10573349E 02	0.33372419E 08	0.94610474E 00

```
      RSQ =     0.9271
        R =     0.9629
F( 2, 38)=   241.5781
   SUMUSQ =   137.9256
DURBIN-W.=     1.8373
```

CARBON-PERMIAN DRY

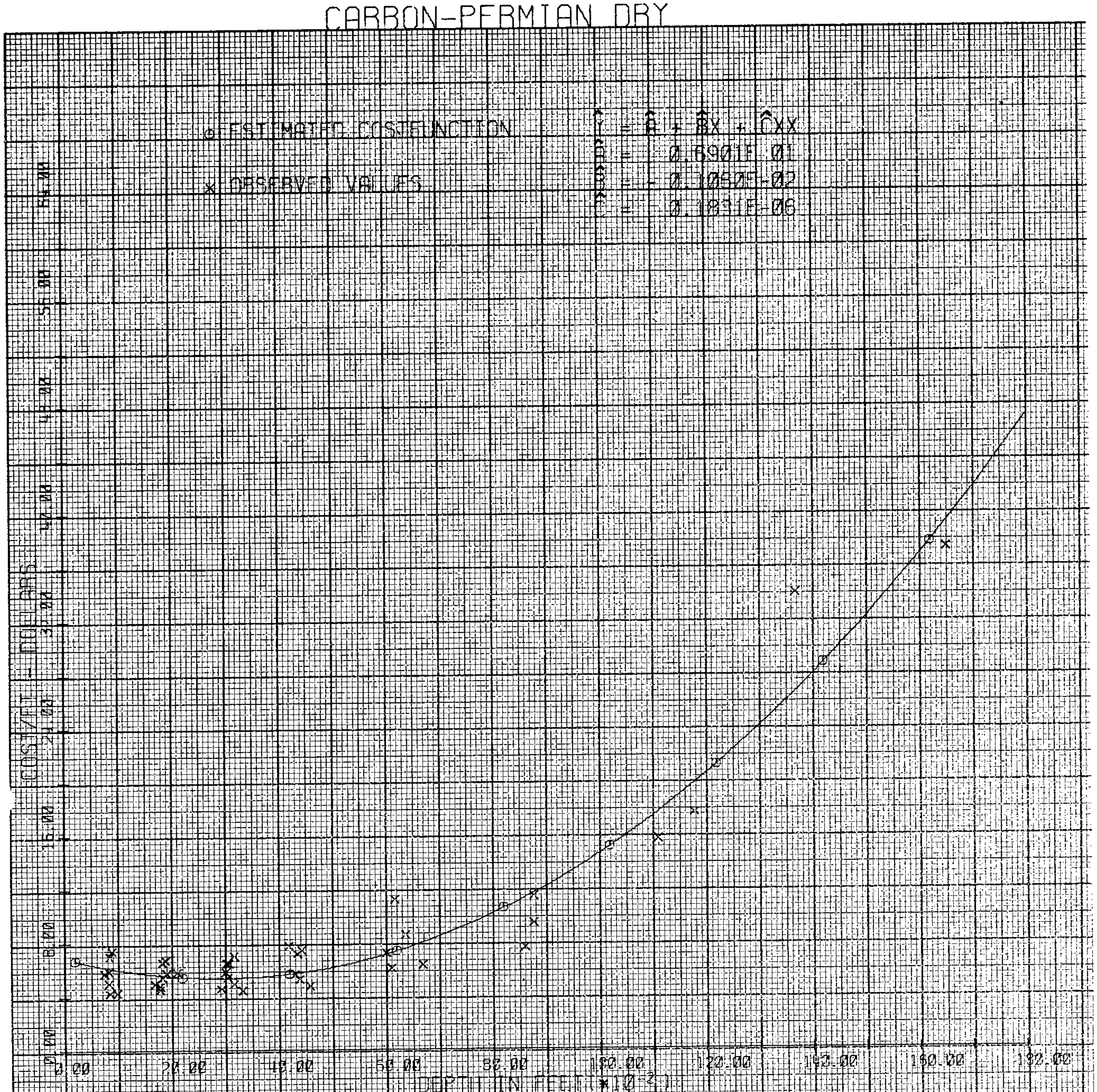


Table 57a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN REGION I

(Carbon Permian)

(in dollars)

```
 DEPTH
  18000.feet
TOTAL COST
          6024.10000
         11026.80000
         16106.70000
         22362.40000
         30892.50000
         42795.60000
         59170.29900
         81115.19900
        109728.90000
        146110.00000
        191357.10000
        246568.80000
        312843.70000
        391280.40000
        482977.50000
        589033.60000
        710547.31000
        848617.20000
MINIMUM AVERAGE COST DEPTH
              2895.feet
MINIMUM MARGINAL COST DEPTH
              1930.feet
MARGINAL COST
            5.33030
            4.85820
            5.48470
            7.20980
           10.03350
           13.95580
           18.97670
           25.09620
           32.31430
           40.63100
           50.04630
           60.56020
           72.17270
           84.88380
           98.69350
          113.60180
          129.60870
          146.71420
POINT OF INFLECTION
       15534.89300
MINIMUM AVERAGE COST
            5.36687
MINIMUM MARGINAL COST
            4.85549
```

Table 58

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN REGION II (Cenozoic)

$\hat{Y} = 9.45 - 0.10(10^{-2})X_1 + 0.17(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

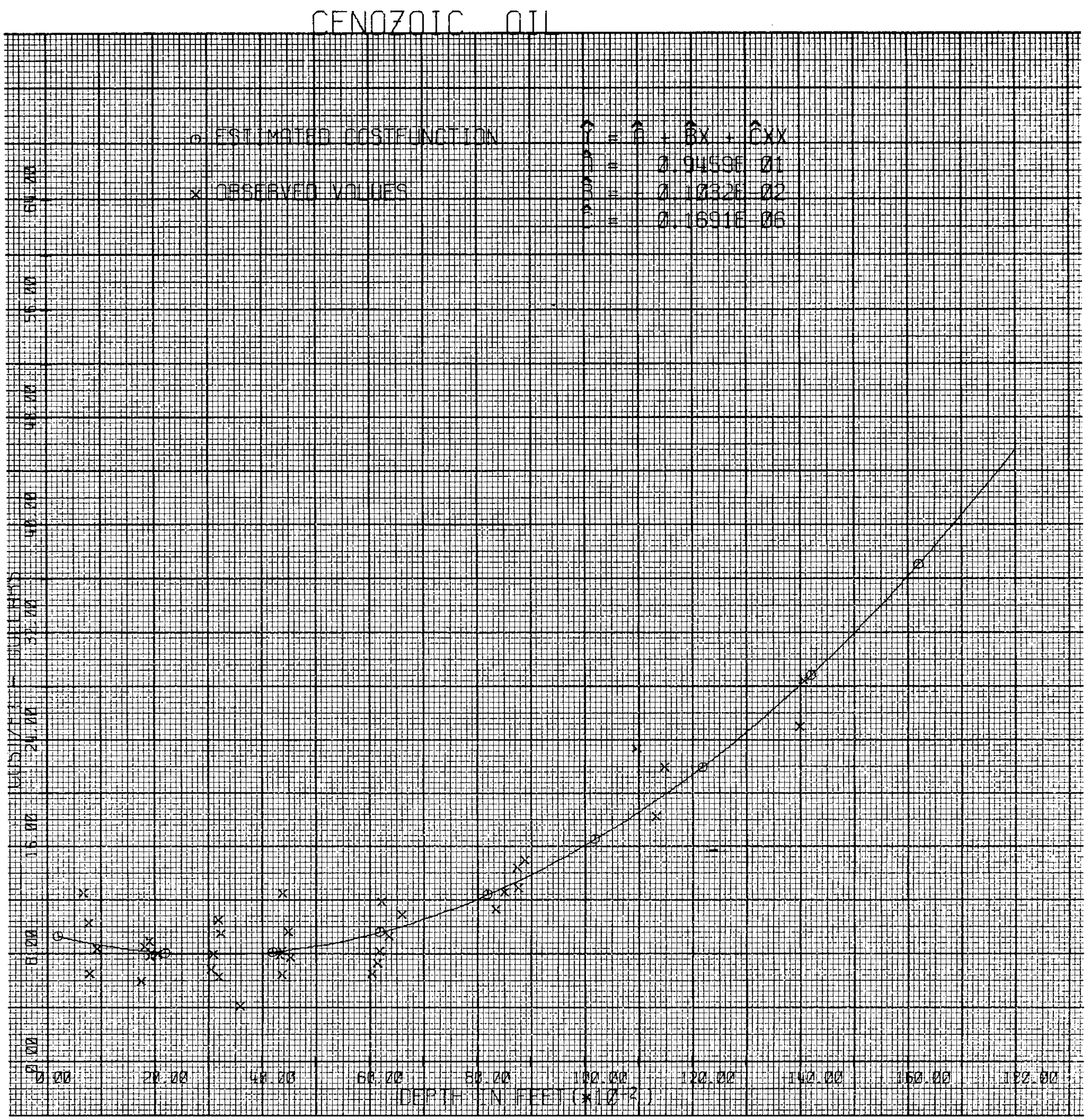
X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	945.	893025.	8.3500	8.6350	-0.2850
2	1910.	3648100.	8.8700	8.1055	0.7645
3	3205.	10272025.	10.4600	7.8898	2.5702
4	4396.	19324816.	12.4500	8.1922	4.2578
5	6235.	38875225.	11.8200	9.6014	2.2186
6	8783.	77141089.	12.8800	13.4445	-0.5645
7	11343.	128663649.	18.2100	19.5171	-1.3071
8	13996.	197944008.	25.0600	28.1494	-3.0894
9	671.	450241.	12.4700	8.8428	3.6272
10	1917.	3674889.	7.7500	8.1028	-0.3528
11	3210.	10304100.	6.2600	7.8901	-1.6301
12	4378.	19166884.	6.3900	8.1840	-1.7940
13	6376.	40653376.	9.3100	9.7567	-0.4467
14	8755.	76650025.	14.4200	13.3903	1.0297
15	10972.	120384784.	23.4000	18.4997	4.9003
16	2052.	4210704.	7.9100	8.0541	-0.1441
17	3250.	10562500.	9.4800	7.8925	1.5875
18	4501.	20259001.	9.5800	8.2419	1.3381
19	6622.	43850884.	10.8800	10.0437	0.8363
20	8891.	79049881.	14.9400	13.6559	1.2841
21	11502.	132296004.	21.9800	19.9674	2.0126
22	14066.	198926178.	28.5500	28.4094	0.1406
23	800.	640000.	6.4800	8.7418	-2.2618
24	1770.	3132900.	5.9200	8.1628	-2.2428
25	3064.	9388096.	6.8200	7.8858	-1.0658
26	4378.	19166884.	8.1300	8.1840	-0.0540
27	6151.	37834801.	7.2800	9.5121	-2.2321
28	8515.	72505225.	12.5800	12.9369	-0.3569
29	787.	619369.	10.2100	8.7517	1.4583
30	1827.	3337929.	8.4700	8.1386	0.3314
31	3101.	9616201.	7.9000	7.8862	0.0138
32	4349.	18913801.	7.8500	8.1712	-0.3212
33	6195.	38378025.	8.1800	9.5586	-1.3786
34	8360.	69889600.	11.2500	12.6545	-1.4045
35	3595.	12924025.	4.0500	7.9360	-3.8860
36	4536.	20575296.	7.6500	8.2592	-0.6092
37	6066.	36796356.	6.4800	9.4242	-2.9442

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.94588698E 01	0.95594873E 00	0.98947459E 01	0.09999999E 01	0.
-0.10316027E-02	0.33478972E-03	-0.30813453E 01	0.54451351E 04	0.82903978E 00
0.16912110E-06	0.23627842E-07	0.71577041E 01	0.42913242E 08	0.91675043E 00

RSQ = 0.8753
R = 0.9356
F(2, 34)= 119.2880
SUMUSQ = 143.8210
DURBIN-W.= 1.2662



CENOZOIC OIL
o ESTIMATED COSTFUNCTION
x OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.9459E 01
B̂ = 0.1032E-02
Ĉ = 0.1691E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET(*10**2)

Table 58a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN REGION II

(Cenozoic)

(in dollars)

```
 DEPTH
   18000.feet
 TOTAL COST
          8596.09990
         16142.80000
         23654.70000
         32146.40000
         42632.50000
         56127.60000
         73646.30000
         96203.20000
        124812.90000
        160490.00000
        204249.10000
        257104.80000
        320071.70000
        394164.40000
        480397.50000
        579785.60000
        693343.30000
        822085.21000
MINIMUM AVERAGE COST DEPTH
               3051.feet
MINIMUM MARGINAL COST DEPTH
               2034. feet
MARGINAL COST
             7.90230
             7.36020
             7.83270
             9.31980
            11.82150
            15.33780
            19.86870
            25.41420
            31.97430
            39.54900
            48.13830
            57.74220
            68.36070
            79.99380
            92.64150
           106.30380
           120.98070
           136.67220
POINT OF INFLECTION
        24059.00300
MINIMUM AVERAGE COST
             7.88445
MINIMUM MARGINAL COST
             7.35960
```

Table 59

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN REGION II (Cenozoic)

$\hat{Y} = 13.55 - 0.16(10^{-2})X_1 + 0.20(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	1090.	1188100.	9.7900	12.0122	-2.2222
2	1751.	3066001.	12.4500	11.3037	1.1463
3	2986.	8916196.	12.3000	10.4397	1.8603
4	4281.	18326961.	11.8200	10.1770	1.6430
5	5995.	35940025.	11.7600	10.8416	0.9184
6	8523.	72641529.	13.5300	13.9272	-0.3972
7	10898.	118766404.	18.6800	19.1120	-0.4320
8	13745.	94462512.	26.7400	28.2458	-1.5058
9	16528.	68293696.	41.0000	40.2502	0.7498
10	761.	579121.	11.0000	12.4288	-1.4288
11	4345.	18879025.	7.0700	10.1811	-3.1111
12	6177.	38155329.	10.1100	10.9800	-0.8700
13	8648.	74787904.	13.5300	14.1449	-0.6149
14	11102.	123254404.	23.2300	19.6606	3.5694
15	13440.	190316800.	27.4200	27.1151	0.3049
16	1934.	3740356.	12.1100	11.1379	0.9721
17	3081.	9492561.	12.1600	10.3981	1.7619
18	4950.	24502500.	9.8400	10.2991	-0.4591
19	6756.	45643536.	10.3300	11.5065	-1.1765
20	8510.	72420100.	12.8900	13.9049	-1.0149
21	11292.	127509264.	20.6200	20.1863	0.4337
22	1997.	3988009.	11.9500	11.0839	0.8661
23	2910.	8468100.	10.5000	10.4756	0.0244
24	9327.	86992929.	15.9900	15.4344	0.5556
25	11409.	130165281.	19.1300	20.5170	-1.3870
26	13952.	197329152.	29.4500	29.0340	0.4160
27	16633.	269164172.	40.1600	40.7626	-0.6026

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.13555149E 02	0.81703498E 00	0.16590659E 02	0.09999999E 01	0.
-0.16295295E-02	0.23521020E-03	-0.69279713E 01	0.75192963E 04	0.87406142E 00
0.19631346E-06	0.13743018E-07	0.14284596E 02	0.79313777E 08	0.96202286E 00

RSQ = 0.9752
R = 0.9875
F(2, 24)= 471.1217
SUMUSQ = 52.4999
DURBIN-W.= 1.5069

CENOZOIC GAS

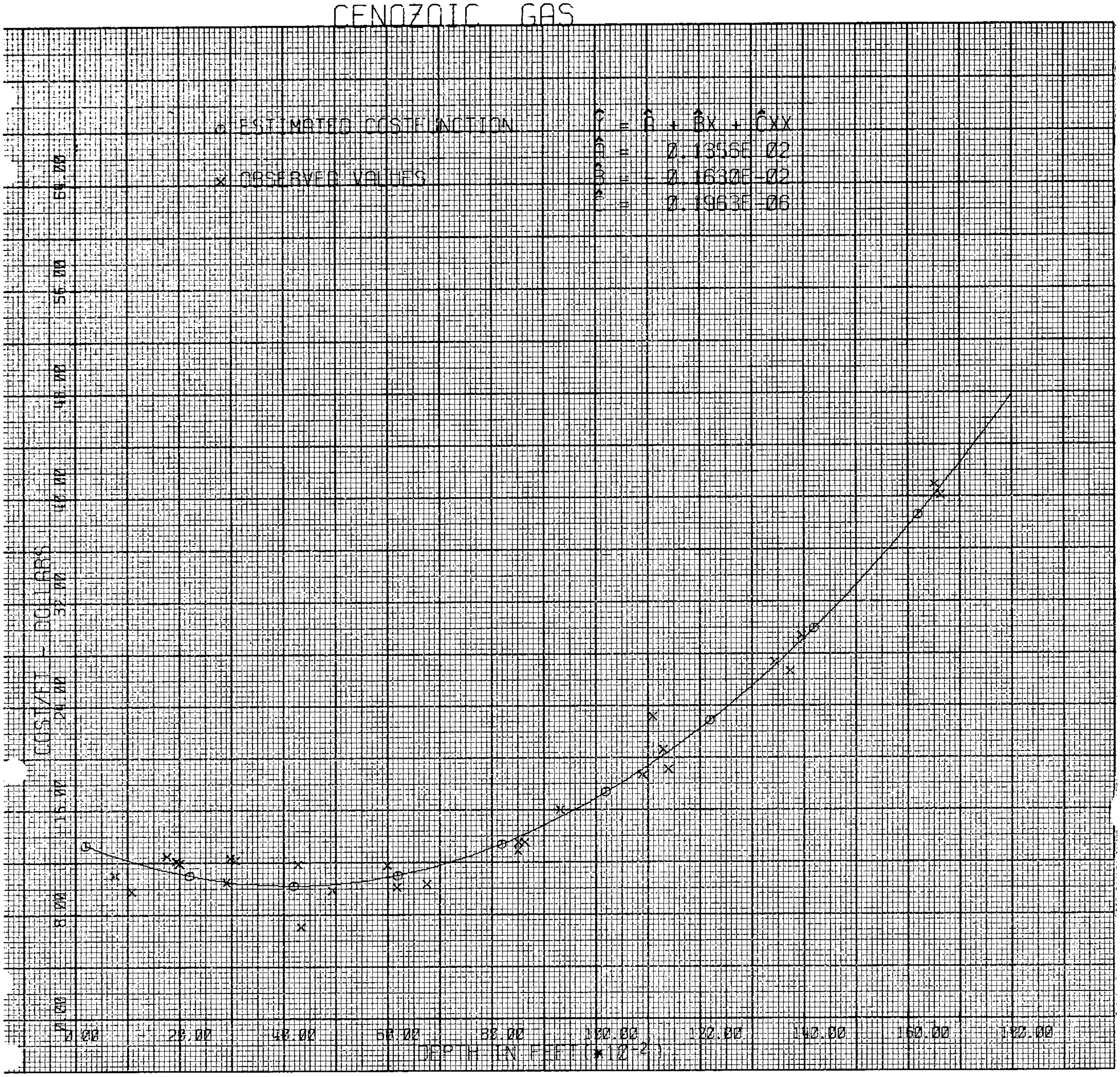


Table 59a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN REGION II

(Cenozoic)

(in dollars)

```
 DEPTH
  18000.feet
 TOTAL COST
       12126.30000
       22170.40000
       31310.10000
       40723.20100
       51537.50000
       65080.80000
       82380.89900
      104665.60000
      133112.70000
      168900.00000
      213205.30000
      267206.40000
      332081.10000
      409007.19000
      499162.50000
      603724.81000
      723871.91000
      860781.60000
MINIMUM AVERAGE COST DEPTH
            4152.feet
MINIMUM MARGINAL COST DEPTH
            2768.feet
MARGINAL COST
          10.88890
           9.39560
           9.08010
           9.94240
          11.98250
          15.20040
          19.59610
          25.16960
          31.92090
          39.85000
          48.95690
          59.24160
          70.70410
          83.34440
          97.16250
         112.15840
         128.33210
         145.68360
POINT OF INFLECTION
       42249.94900
MINIMUM AVERAGE COST
          10.17628
MINIMUM MARGINAL COST
           9.04837
```

Table 60

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN REGION II (Cenozoic)

$\hat{Y} = 7.45 - 0.15\,(10^{-2})X_1 + 0.20(10^{-6})X_2$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	847.	717409.	7.1300	6.3232	0.8068
2	1877.	3523129.	5.6400	5.3299	0.3101
3	3153.	9941409.	5.1600	4.6849	0.4751
4	4307.	18550249.	5.8600	4.6596	1.2004
5	6225.	38750625.	7.5000	5.7900	1.7100
6	8787.	77211369.	10.9900	9.5839	1.4061
7	11219.	125865961.	16.0600	15.6021	0.4579
8	13633.	92929344.	17.0000	23.9036	-6.9036
9	2532.	6411024.	5.0000	4.9179	0.0821
10	4434.	19660356.	5.4900	4.6892	0.8008
11	5917.	35010889.	6.5800	5.5098	1.0702
12	8548.	73068304.	9.5200	9.1195	0.4005
13	11472.	131606784.	9.8300	16.3633	-6.5333
14	836.	698896.	7.0000	6.3361	0.6639
15	1825.	3330625.	5.8400	5.3700	0.4700
16	3065.	9394225.	4.6000	4.7086	-0.1086
17	4329.	18740241.	4.0800	4.6643	-0.5843
18	6121.	37466641.	4.1200	5.6911	-1.5711
19	8715.	75951225.	9.0300	9.4416	-0.4116
20	11045.	121992025.	15.3200	15.0933	0.2267
21	815.	664225.	4.0600	6.3609	-2.3009
22	1806.	3261636.	3.4600	5.3849	-1.9249
23	3049.	9296401.	4.0800	4.7132	-0.6332
24	4291.	18412681.	6.6300	4.6563	1.9737
25	6122.	37478884.	5.5900	5.6921	-0.1021
26	8635.	74563225.	10.4800	9.2859	1.1941
27	11215.	125776225.	19.3300	15.5903	3.7397
28	13464.	190639648.	28.5300	23.2470	5.2830
29	18690.	287329025.	50.0400	48.8123	1.2277
30	3427.	11744329.	5.1700	4.6309	0.5391
31	4513.	20367169.	4.1100	4.7108	-0.6008
32	6091.	37100281.	3.3000	5.6634	-2.3634

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.74564342E 01	0.11190859E 01	0.66629682E 01	0.09999999E 01	0.
-0.15064259E-02	0.32130256E-03	-0.46884961E 01	0.62814062E 04	0.83049481E 00
0.19899150E-06	0.18729658E-07	0.10624406E 02	0.58219077E 08	0.94260571E 00

```
        RSQ =     0.9366
          R =     0.9678
 F( 2, 29)=   214.1302
     SUMUSQ =   167.9000
 DURBIN-W.=       1.5513
```

CENOZOIC DRY

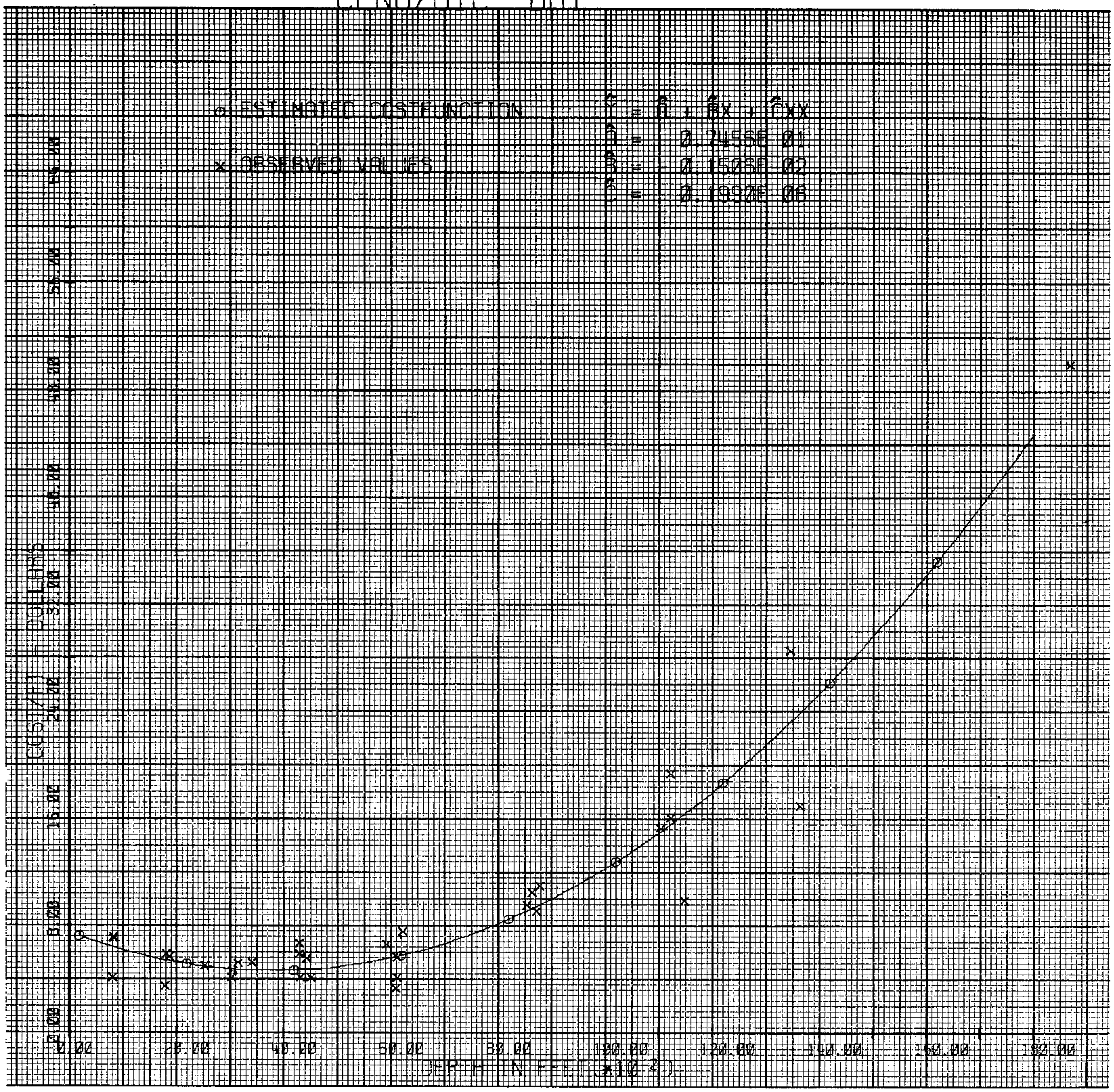


Table 60a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN REGION II

(Cenozoic)

(in dollars)

```
 DEPTH
  18000.feet
 TOTAL COST
          6149.00000
         10480.00000
         14187.00000
         18464.00000
         24505.00000
         33504.00000
         46654.99900
         65151.99900
         90188.99900
        122960.00000
        164659.00000
        216480.00000
        279617.00000
        355264.00000
        444615.00000
        548864.00000
        669205.01000
        806832.00000
MINIMUM AVERAGE COST DEPTH
              3784.feet
MINIMUM MARGINAL COST DEPTH
              2523.feet
MARGINAL COST
             5.04100
             3.82000
             3.79300
             4.96000
             7.32100
            10.87600
            15.62500
            21.56800
            28.70500
            37.03600
            46.56100
            57.28000
            69.19300
            82.30000
            96.60100
           112.09600
           128.78500
           146.66800
POINT OF INFLECTION
        17431.41500
MINIMUM AVERAGE COST
             4.60671
MINIMUM MARGINAL COST
             3.65694
```

Table 61

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR OIL WELLS IN REGION III (Mesozoic)

$$\hat{Y} = 18.40 - 0.24(10^{-2})X_1 + 0.195(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	727.	528529.	17.1000	16.7513	0.3487
2	1705.	2907025.	15.0500	14.8465	0.2035
3	2955.	8732025.	12.5500	12.9552	-0.4052
4	4283.	18344089.	10.4300	11.6137	-1.1837
5	5867.	34421689.	12.1400	10.9134	1.2266
6	771.	594441.	16.2300	16.6576	-0.4276
7	1821.	3316041.	13.5000	14.6453	-1.1453
8	3091.	9554281.	11.3900	12.7862	-1.3962
9	4347.	18896409.	9.7500	11.5665	-1.8165
10	6068.	36820624.	10.0900	10.8945	-0.8045
11	8519.	72573361.	12.5200	11.9321	0.5879
12	11028.	121616784.	16.7100	15.4216	1.2884
13	13193.	187027624.	18.2600	20.4066	-2.1466
14	839.	703921.	19.2800	16.5142	2.7658
15	1958.	3833764.	15.2800	14.4145	0.8655
16	3267.	10673289.	12.4700	12.5782	-0.1082
17	4446.	19766916.	10.2600	11.4965	-1.2365
18	6509.	42367081.	12.2000	10.9083	1.2917
19	9047.	81848209.	13.8600	12.4624	1.3976
20	11324.	128232976.	16.6900	15.9953	0.6947

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.18408988E 02	0.80086083E 00	0.22986501E 02	0.09999999E 01	0.
-0.24220044E-02	0.31520085E-03	-0.76840034E 01	0.50882500E 04	0.10599291E-00
0.19505961E-06	0.23715746E-07	0.82248984E 01	0.39489334E 08	0.33428725E-00

RSQ = 0.8014
R = 0.8952
F(2, 17)= 34.3054
SUMUSQ = 31.2811
DURBIN-W.= 1.9952

MESOZOIC OIL

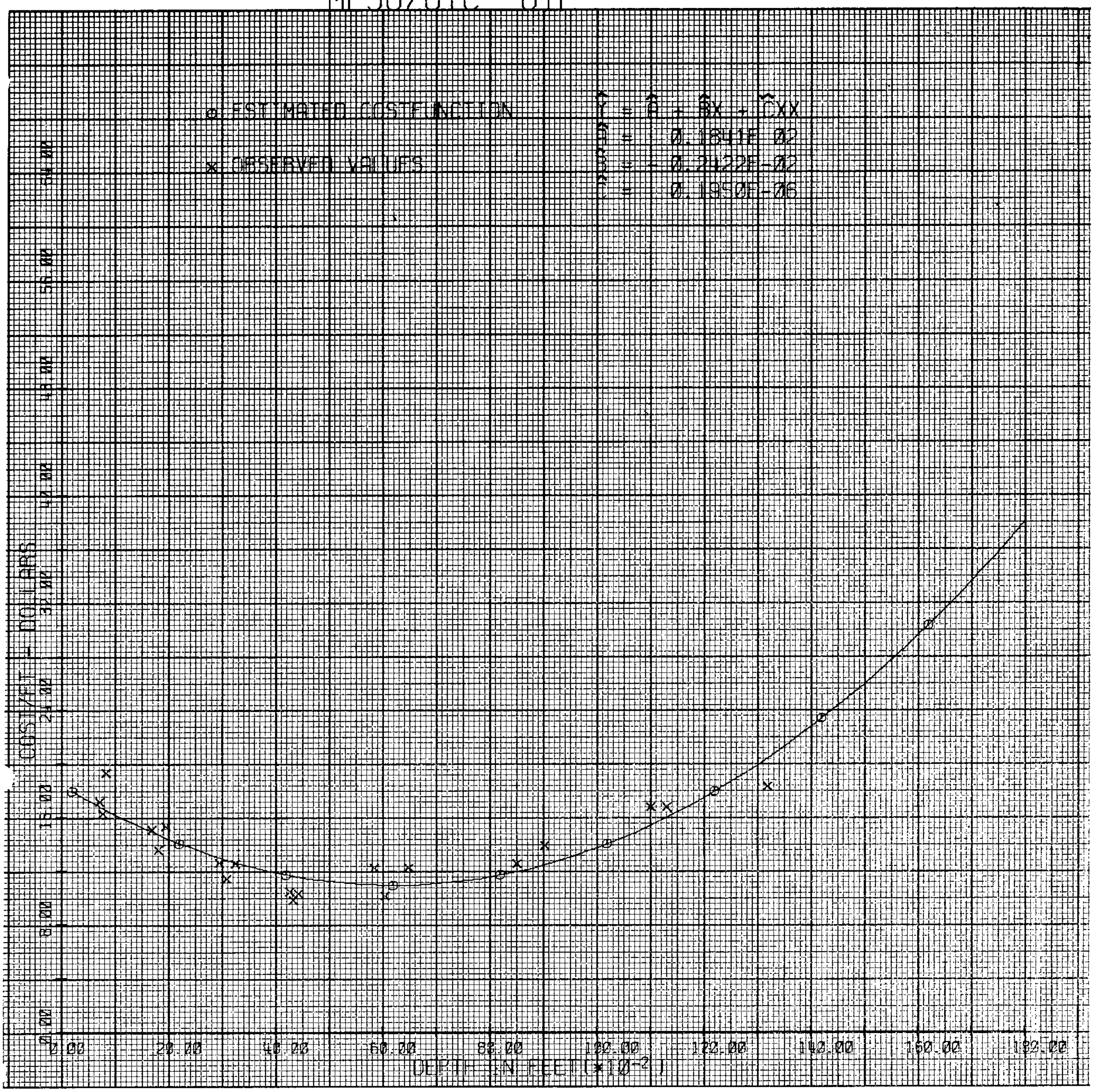


Table 61a

TOTAL AND MARGINAL DRILLING COSTS FOR OIL WELLS IN REGION III

(Mesozoic)

(in dollars)

```
 DEPTH
  18000.feet
 TOTAL COST
        16183.00000
        28692.00000
        38697.00100
        47368.00000
        55875.00000
        65388.00100
        77077.00100
        92112.00000
       111663.00000
       136900.00000
       168993.00000
       209112.00000
       258427.00000
       318108.00000
       389325.00000
       473248.00000
       571047.01000
       683892.00000
MINIMUM AVERAGE COST DEPTH
            6210.feet
MINIMUM MARGINAL COST DEPTH
            4140.feet
MARGINAL COST
           14.15100
           11.06200
            9.14300
            8.39400
            8.81500
           10.40600
           13.16700
           17.09800
           22.19900
           28.47000
           35.91100
           44.52200
           54.30300
           65.25400
           77.37500
           90.66600
          105.12700
          120.75800
POINT OF INFLECTION
        67625.84000
MINIMUM AVERAGE COST
           10.88938
MINIMUM MARGINAL COST
            8.38251
```

Table 62

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR GAS WELLS IN REGION III (Mesozoic)

$$\hat{Y} = 12.60 - 0.9(10^{-3})\,X_1 + 0.16(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	5828.	33965584.	14.3400	12.7338	1.6062
2	8182.	66945124.	17.3300	15.8620	1.4680
3	2236.	4999696.	12.0500	11.3673	0.6827
4	3455.	11937025.	10.7500	11.3697	-0.6197
5	4536.	20575296.	9.9800	11.7683	-1.7883
6	6776.	45914176.	12.8600	13.7810	-0.9210
7	8917.	79512889.	12.3200	17.2009	-4.8809
8	12022.	72264242.	25.3200	24.7589	0.5611
9	14189.	100663860.	28.3700	31.8560	-3.4860
10	17007.	72309512.	44.4200	43.3258	1.0942
11	4294.	18438436.	11.4000	11.6467	-0.2467
12	6003.	36036009.	13.5800	12.9056	0.6744
13	8346.	69655716.	19.5200	16.1459	3.3741
14	11427.	130576329.	24.9000	23.0724	1.8276
15	14050.	98701250.	32.0100	31.3558	0.6542

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.12595283E 02	0.27131832E 01	0.46422530E 01	0.09999999E 01	0.
-0.90584718E-03	0.65613861E-03	-0.13805728E 01	0.84845333E 04	0.93294191E 00
0.15950979E-06	0.34077887E-07	0.46807418E 01	0.90070200E 08	0.97305916E 00

```
      RSQ =     0.9541
        R =     0.9768
F( 2, 12)=   124.8032
   SUMUSQ =    62.7873
DURBIN-W.=     1.6055
```

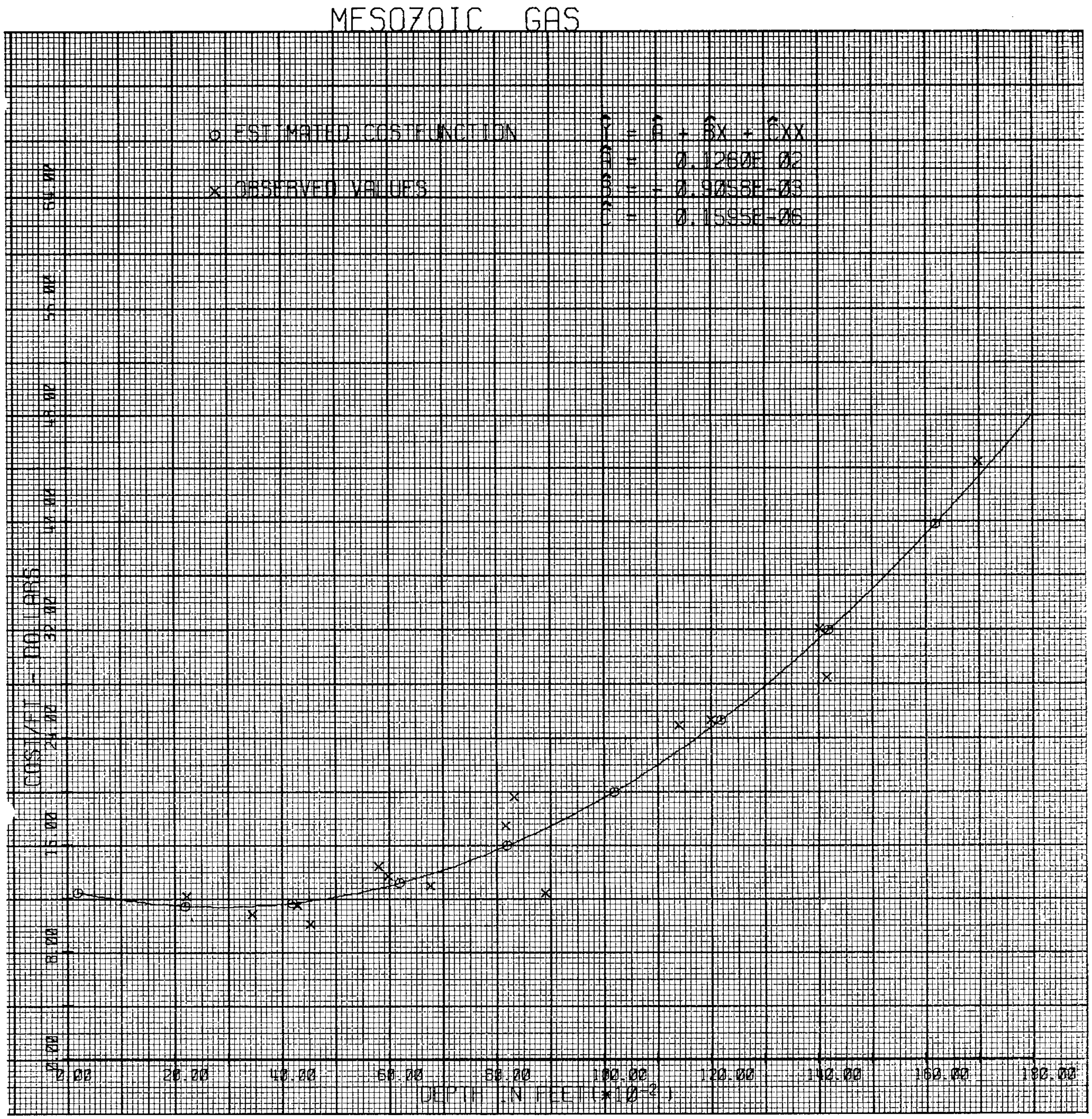

MESOZOIC GAS
⊙ ESTIMATED COSTFUNCTION
× OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1260E 02
B̂ = - 0.9058E-03
Ĉ = 0.1595E-06
COST/FT - DOLLARS
DEPTH IN FEET(*10^-2)

Table 62a

TOTAL AND MARGINAL DRILLING COSTS FOR GAS WELLS IN REGION III

(Mesozoic)

(in dollars)

```
  DEPTH
   18000.feet
 TOTAL COST
         11853.70000
         22852.80000
         33954.30000
         46115.20000
         60292.50100
         77443.20100
         98524.30000
        124492.80000
        156305.70000
        194920.00000
        241292.70000
        296380.80000
        361141.30000
        436531.20000
        523507.50000
        623027.19000
        736047.30000
        863524.80000
MINIMUM AVERAGE COST DEPTH
             2839.feet
MINIMUM MARGINAL COST DEPTH
             1893.feet
MARGINAL COST
             11.26690
             10.89080
             11.47170
             13.00960
             15.50450
             18.95640
             23.36530
             28.73120
             35.05410
             42.33400
             50.57090
             59.76480
             69.91570
             81.02360
             93.08850
            106.11040
            120.08930
            135.02520
POINT OF INFLECTION
         32126.06100
MINIMUM AVERAGE COST
             11.31399
MINIMUM MARGINAL COST
             10.88532
```

Table 63

ESTIMATED AVERAGE DRILLING COST FUNCTION FOR DRY HOLES IN REGION III (Mesozoic)

$$\hat{Y} = 19.33 - 0.39(10^{-2})X_1 + 0.32(10^{-6})X_2$$

Where:

$\hat{Y}$ = Estimated drilling cost per foot

X_1 = Depth

X_2 = Square of depth

SAMPLE NUMBER	OBSERVED VALUES X_1	X_2	Y	ESTIMATED VALUES $\hat{Y}$	RESIDUAL $Y - \hat{Y}$
1	740.	547600.	15.6900	16.5996	-0.9096
2	1637.	2679769.	12.2500	13.7608	-1.5108
3	2922.	8538084.	9.2900	10.6008	-1.3108
4	4157.	17280649.	6.2900	8.5699	-2.2799
5	5795.	33582025.	6.3200	7.3980	-1.0780
6	8493.	72131049.	14.2700	9.2502	5.0198
7	858.	736164.	17.1900	16.1964	0.9936
8	1829.	3345241.	14.8700	13.2208	1.6492
9	3081.	9492561.	11.5700	10.2840	1.2860
10	4337.	18809569.	8.5000	8.3563	0.1437
11	6163.	37982569.	9.0500	7.3734	1.6766
12	8717.	75986089.	11.0100	9.6156	1.3944
13	11109.	123409881.	13.2900	15.5409	-2.2509
14	13277.	188139364.	16.8900	24.1078	-7.2178
15	18403.	284667602.	61.7100	56.4523	5.2577
16	811.	657721.	14.0200	16.3559	-2.3359
17	1694.	2869636.	11.4100	13.5980	-2.1880
18	3086.	9523396.	11.0600	10.2743	0.7857
19	4309.	18567481.	10.0200	8.3882	1.6318
20	6069.	36832761.	12.6400	7.3714	5.2686
21	8815.	77704225.	11.9100	9.7857	2.1243
22	11075.	122655625.	14.5200	15.4308	-0.9108
23	13603.	192520804.	20.4200	25.6589	-5.2389

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.19333119E 02	0.15670921E 01	0.12336938E 02	0.09999999E 01	0.
-0.39332607E-02	0.47160805E-03	-0.83401049E 01	0.61295652E 04	0.60701833E 00
0.32333207E-06	0.27430759E-07	0.11787207E 02	0.59709687E 08	0.80259019E 00

RSQ = 0.9205
R = 0.9594
F(2, 20)= 115.8361
SUMUSQ = 205.3996
DURBIN-W.= 1.8129

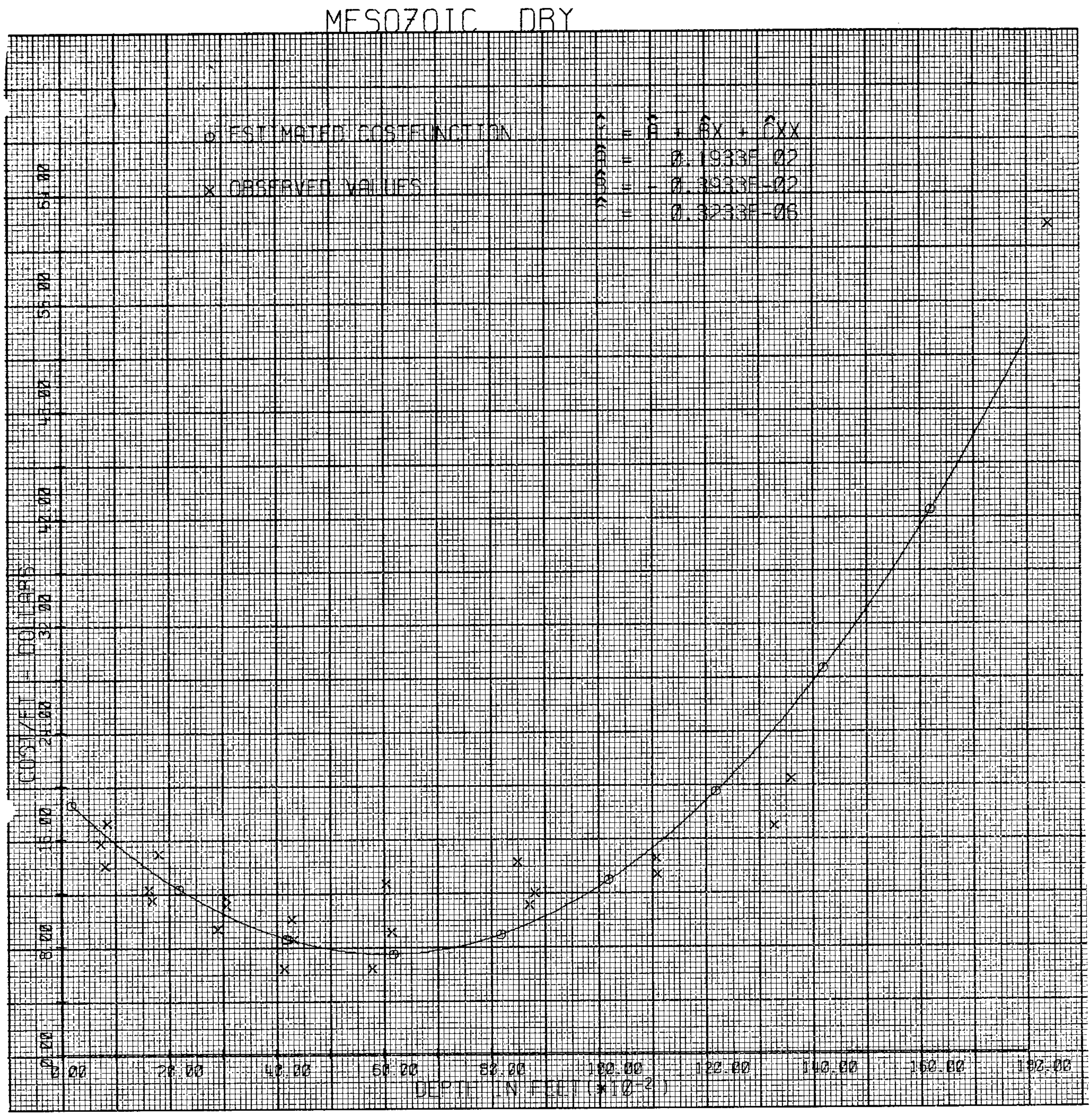

MESOZOIC DRY
ESTIMATED COSTFUNCTION
OBSERVED VALUES
Ŷ = Â + B̂X + ĈXX
Â = 0.1933E 02
B̂ = - 0.3933E-02
Ĉ = 0.3233E-06
COST/FT - DOLLARS
0.00
8.00
16.00
24.00
32.00
40.00
48.00
56.00
64.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DEPTH IN FEET (*10-2)

Table 63a

TOTAL AND MARGINAL DRILLING COSTS FOR DRY HOLES IN REGION III

(Mesozoic)

(in dollars)

```
  DEPTH
   18000.feet
 TOTAL COST
           15720.30000
           25514.40000
           31322.10000
           35083.20000
           38737.49900
           44224.79800
           53484.89800
           68457.59800
           91082.69700
          123300.00000
          167049.30000
          224270.39000
          296903.09000
          386887.19000
          496162.49000
          626668.79000
          780345.89000
          959133.60000
MINIMUM AVERAGE COST DEPTH
                 6083 feet
MINIMUM MARGINAL COST DEPTH
                 4055.feet
MARGINAL COST
              12.43390
               7.47760
               4.46110
               3.38440
               4.24750
               7.05040
              11.79310
              18.47560
              27.09790
              37.66000
              50.16190
              64.60360
              80.98510
              99.30640
             119.56750
             141.76840
             165.90910
             191.98960
POINT OF INFLECTION
           44820.11000
MINIMUM AVERAGE COST
               7.36859
MINIMUM MARGINAL COST
               3.38146
```

SECTION II: INTERMEDIATE SIZE DIAMETER DRILLING COST FUNCTIONS

Includes Tables 1 to 44 and Figures of Average Costs for Cased and Uncased Wells as a Function of Both Depth and Diameter.

Table 1

MUD COSTS AS A FUNCTION OF

DEPTH AND DIAMETER

(in dollars)

$$Y_{MU} = \frac{1}{5.6148} \left(\pi \cdot \frac{\phi^2}{4} \cdot D \cdot P \cdot 2 \right)$$

Where:

Y_{MU} = Mud cost per well;

P = Price of mud per barrel equal to $4.00 in our calculations;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations.

Y_{MU} (given ϕ = 10 in.)	Y_{MU} (given ϕ = 11 in.)	Y_{MU} (given ϕ = 12 in.)	Y_{MU} (given ϕ = 13 in.)	Y_{MU} (given ϕ = 14 in.)	Y_{MU} (given ϕ = 15 in.)
777.11	940.30	1119.04	1313.32	1523.14	1748.50
1554.22	1880.61	2238.08	2626.63	3046.27	3497.00
2331.33	2820.91	3357.12	3939.95	4569.41	5245.50
3108.44	3761.21	4476.16	5253.27	6092.55	6993.99
3885.55	4701.52	5595.19	6566.58	7615.68	8742.49
4662.66	5641.82	6714.23	7879.90	9138.82	10490.99
5439.77	6582.13	7833.27	9193.22	10661.95	12239.49
6216.88	7522.43	8952.31	10506.53	12185.09	13987.99
6993.99	8462.73	10071.35	11819.85	13708.23	15736.49
7771.10	9403.04	11190.39	13133.17	15231.36	17484.98

Y_{MU} (given ϕ = 16 in.)	Y_{MU} (given ϕ = 17 in.)	Y_{MU} (given ϕ = 18 in.)	Y_{MU} (given ϕ = 19 in.)	Y_{MU} (given ϕ = 20 in.)	Y_{MU} (given ϕ = 21 in.)
1989.40	2245.85	2517.84	2805.37	3108.44	3427.06
3978.81	4491.70	5035.68	5610.74	6216.88	6854.11
5968.21	6737.55	7553.51	8416.11	9325.32	10281.17
7957.61	8983.40	10071.35	11221.47	12433.77	13708.23
9947.01	11229.25	12589.19	14026.84	15542.21	17135.28
11936.42	13475.09	15107.03	16832.21	18650.65	20562.34
13925.82	15720.94	17624.86	19637.58	21759.09	23989.40
15915.22	17966.79	20142.70	22442.95	24867.53	27416.46
17904.62	20212.64	22660.54	25248.32	27975.97	30843.51
19894.03	22458.49	25178.38	28053.68	31084.42	34270.57

Continued

Y_{MU} (given ϕ = 22 in.)	Y_{MU} (given ϕ = 23 in.)	Y_{MU} (given ϕ = 24 in.)	Y_{MU} (given ϕ = 25 in.)	Y_{MU} (given ϕ = 26 in.)	Y_{MU} (given ϕ = 27 in.)
3761.21	4110.91	4476.16	4856.94	5253.27	5665.13
7522.43	8221.83	8952.31	9713.88	10506.53	11330.27
11283.64	12332.74	13428.47	14570.82	15759.80	16995.40
15044.86	16443.66	17904.62	19427.76	21013.06	22660.54
18806.07	20554.57	22380.78	24284.70	26266.33	28325.67
22567.29	24665.48	26856.94	29141.64	31519.60	33990.81
26328.50	28776.40	31333.09	33998.58	36772.86	39655.94
30089.71	32887.31	35809.25	38855.52	42026.13	45321.08
33850.93	36998.23	40285.40	43712.46	47279.40	50986.21
37612.14	41109.14	44761.56	48569.40	52532.66	56651.35

Y_{MU} (given ϕ = 28 in.)	Y_{MU} (given ϕ = 29 in.)	Y_{MU} (given ϕ = 30 in.)	Y_{MU} (given ϕ = 31 in.)	Y_{MU} (given ϕ = 32 in.)	Y_{MU} (given ϕ = 33 in.)
6092.55	6535.50	6993.99	7468.03	7957.61	8462.73
12185.09	13071.00	13987.99	14936.06	15915.22	16925.46
18277.64	19606.50	20981.98	22404.09	23872.83	25388.20
24370.18	26141.99	27975.97	29872.12	31830.44	33850.93
30462.73	32677.49	34969.97	37340.15	39788.05	42313.66
36555.27	39212.99	41963.96	44808.19	47745.66	50776.39
42647.82	45748.49	48957.96	52276.22	55703.27	59239.13
48740.36	52283.99	55951.95	59744.25	63660.88	67701.86
54832.91	58819.49	62945.94	67212.28	71618.49	76164.59
60925.46	65354.98	69939.94	74680.31	79576.11	84627.32

Y_{MU} (given ϕ = 34 in.)	Y_{MU} (given ϕ = 35 in.)	Y_{MU} (given ϕ = 36 in.)	Y_{MU} (given ϕ = 37 in.)	Y_{MU} (given ϕ = 38 in.)	Y_{MU} (given ϕ = 39 in.)
8983.40	9519.60	10071.35	10638.64	11221.47	11819.85
17966.79	19039.20	20142.70	21277.28	22442.95	23639.70
26950.19	28558.81	30214.05	31915.93	33664.42	35459.55
35933.59	38078.41	40285.40	42554.57	44885.90	47279.40
44916.98	47598.01	50356.75	53193.21	56107.37	59099.25
53900.38	57117.61	60428.11	63831.85	67328.84	70919.10
62883.77	66637.22	70499.46	74470.49	78550.32	82738.94
71867.17	76156.82	80570.81	85109.13	89771.79	94558.79
80850.57	85676.42	90642.16	95747.77	100993.27	106378.64
89833.96	95196.02	100713.51	106386.41	112214.74	118198.49

Y_{MU} (given ϕ = 40 in.)	Y_{MU} (given ϕ = 41 in.)	Y_{MU} (given ϕ = 42 in.)	Y_{MU} (given ϕ = 43 in.)	Y_{MU} (given ϕ = 44 in.)	Y_{MU} (given ϕ = 45 in.)
12433.77	13063.23	13708.23	14368.77	15044.86	15736.49
24867.53	26126.45	27416.46	28737.54	30089.71	31472.97
37301.30	39189.68	41124.68	43106.31	45134.57	47209.46
49735.07	52252.90	54832.91	57475.09	60179.43	62945.94
62168.83	65316.13	68541.14	71843.86	75224.29	78682.43
74602.60	78379.36	82249.36	86212.63	90269.14	94418.91
87036.37	91442.58	95957.59	100581.40	105314.00	110155.40
99470.13	104505.81	109665.82	114950.17	120358.86	125891.88
111903.90	117569.03	123374.05	129318.94	135403.72	141628.37
124337.66	130632.26	137082.28	143687.71	150448.57	157364.86

Table 2

CUTTER COSTS FOR SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

$$Y_{CU} = \pi \frac{\phi^2}{4} DC_H$$

Where:

Y_{CU} = Cutter cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}$ ϕ;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

C_H = Cost per foot of linear cut as a function of the geological medium equal to \$0.50 in the below calculations for soft rock.

Y_{CU} (given ϕ = 10 in.)	Y_{CU} (given ϕ = 11 in.)	Y_{CU} (given ϕ = 12 in.)	Y_{CU} (given ϕ = 13 in.)	Y_{CU} (given ϕ = 14 in.)	Y_{CU} (given ϕ = 15 in.)
272.71	329.98	392.70	460.88	534.51	613.59
545.41	659.95	785.40	921.75	1069.01	1227.18
818.12	989.93	1178.10	1382.63	1603.52	1840.78
1090.83	1319.90	1570.79	1843.50	2138.03	2454.37
1363.54	1649.88	1963.49	2304.38	2672.53	3067.96
1636.24	1979.86	2356.19	2765.25	3207.04	3681.55
1908.95	2309.83	2748.89	3226.13	3741.55	4295.14
2181.66	2639.81	3141.59	3687.00	4276.05	4908.73
2454.37	2969.78	3534.29	4147.88	4810.56	5522.33
2727.07	3299.76	3926.99	4608.76	5345.07	6135.92

Y_{CU} (given ϕ = 16 in.)	Y_{CU} (given ϕ = 17 in.)	Y_{CU} (given ϕ = 18 in.)	Y_{CU} (given ϕ = 19 in.)	Y_{CU} (given ϕ = 20 in.)	Y_{CU} (given ϕ = 21 in.)
698.13	788.12	883.57	984.47	1090.83	1202.64
1396.26	1576.25	1767.14	1968.95	2181.66	2405.28
2094.39	2364.37	2650.72	2953.42	3272.49	3607.92
2792.52	3152.50	3534.29	3937.90	4363.32	4810.56
3490.66	3940.62	4417.86	4922.37	5454.15	6013.20
4188.79	4728.75	5301.43	5906.84	6544.98	7215.84
4886.92	5516.87	6185.01	6891.32	7635.81	8418.48
5585.05	6305.00	7068.58	7875.79	8726.64	9621.12
6283.18	7093.12	7952.15	8860.27	9817.47	10823.76
6981.31	7881.25	8835.72	9844.74	10908.30	12026.40

Continued

Y_{CU} (given ϕ = 22 in.)	Y_{CU} (given ϕ = 23 in.)	Y_{CU} (given ϕ = 24 in.)	Y_{CU} (given ϕ = 25 in.)	Y_{CU} (given ϕ = 26 in.)	Y_{CU} (given ϕ = 27 in.)
1319.90	1442.62	1570.79	1704.42	1843.50	1988.04
2639.81	2885.24	3141.59	3408.84	3687.00	3976.07
3959.71	4327.87	4712.38	5113.26	5530.51	5964.11
5279.62	5770.49	6283.18	6817.69	7374.01	7952.15
6599.52	7213.11	7853.97	8522.11	9217.51	9940.19
7919.42	8655.73	9424.77	10226.53	11061.01	11928.22
9239.33	10098.36	10995.57	11930.95	12904.52	13916.26
10559.23	11540.98	12566.36	13635.37	14748.02	15904.30
11879.14	12983.60	14137.16	15339.80	16591.52	17892.34
13199.04	14426.22	15707.95	17044.22	18435.02	19880.37

Y_{CU} (given ϕ = 28 in.)	Y_{CU} (given ϕ = 29 in.)	Y_{CU} (given ϕ = 30 in.)	Y_{CU} (given ϕ = 31 in.)	Y_{CU} (given ϕ = 32 in.)	Y_{CU} (given ϕ = 33 in.)
2138.03	2293.47	2454.37	2620.72	2792.52	2969.78
4276.05	4586.94	4908.73	5241.44	5585.05	5939.57
6414.08	6880.41	7363.10	7862.16	8377.57	8909.35
8552.11	9173.88	9817.47	10482.87	11170.10	11879.14
10690.13	11467.35	12271.84	13103.59	13962.62	14848.92
12828.16	13760.82	14726.20	15724.31	16755.15	17818.71
14966.19	16054.29	17180.57	18345.03	19547.67	20788.49
17104.21	18347.76	19634.94	20965.75	22340.20	23758.27
19242.24	20641.23	22089.30	23586.47	25132.72	26728.06
21380.27	22934.70	24543.67	26207.19	27925.24	29697.84

Y_{CU} (given ϕ = 34 in.)	Y_{CU} (given ϕ = 35 in.)	Y_{CU} (given ϕ = 36 in.)	Y_{CU} (given ϕ = 37 in.)	Y_{CU} (given ϕ = 38 in.)	Y_{CU} (given ϕ = 39 in.)
3152.50	3340.67	3534.29	3733.37	3937.90	4147.88
6305.00	6681.33	7068.58	7466.73	7875.79	8295.76
9457.50	10022.00	10602.87	11200.10	11813.69	12443.64
12609.99	13362.67	14137.16	14933.46	15751.58	16591.52
15762.49	16703.33	17671.44	18666.83	19689.48	20739.40
18914.99	20044.00	21205.73	22400.19	23627.37	24887.28
22067.49	23384.67	24740.02	26133.56	27565.27	29035.16
25219.99	26725.33	28274.31	29866.92	31503.17	33183.04
28372.48	30066.00	31808.60	33600.29	35441.06	37330.92
31524.98	33406.66	35342.89	37333.65	39378.96	41478.81

Y_{CU} (given ϕ = 40 in.)	Y_{CU} (given ϕ = 41 in.)	Y_{CU} (given ϕ = 42 in.)	Y_{CU} (given ϕ = 43 in.)	Y_{CU} (given ϕ = 44 in.)	Y_{CU} (given ϕ = 45 in.)
4363.32	4584.21	4810.56	5042.36	5279.62	5522.33
8726.64	9168.42	9621.12	10084.72	10559.23	11044.65
13089.96	13752.64	14431.68	15127.08	15838.85	16566.98
17453.28	18336.85	19242.24	20169.44	21118.47	22089.30
21816.60	22921.06	24052.80	25211.81	26398.08	27611.63
26179.92	27505.27	28863.36	30254.17	31677.70	33133.96
30543.24	32089.49	33673.92	35296.53	36957.32	38656.28
34906.56	36673.70	38484.48	40338.89	42236.93	44178.61
39269.87	41257.91	43295.04	45381.25	47516.55	49700.94
43633.19	45842.13	48105.60	50423.61	52796.17	55223.26

Table 3

CUTTER COSTS FOR MEDIUM SOFT ROCK

AS A FUNCTION OF DEPTH AND DIAMETER

(in dollars)

$$Y_{CU} = \pi \frac{\phi^2}{4} DC_H$$

Where:

Y_{CU} = Cutter cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID$\approx \frac{2}{3}$ ϕ;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

C_H = Cost per foot of linear cut as a function of the geological medium equal to \$0.75 in the below calculations for medium soft rock.

Y_{CU} (given ϕ = 10 in.)	Y_{CU} (given ϕ = 11 in.)	Y_{CU} (given ϕ = 12 in.)	Y_{CU} (given ϕ = 13 in.)	Y_{CU} (given ϕ = 14 in.)	Y_{CU} (given ϕ = 15 in.)
409.06	494.96	589.05	691.31	801.76	920.39
818.12	989.93	1178.10	1382.63	1603.52	1840.78
1227.18	1484.89	1767.14	2073.94	2405.28	2761.16
1636.24	1979.86	2356.19	2765.25	3207.04	3681.55
2045.31	2474.82	2945.24	3456.57	4008.80	4601.94
2454.37	2969.78	3534.29	4147.88	4810.56	5522.33
2863.43	3464.75	4123.34	4839.19	5612.32	6442.71
3272.49	3959.71	4712.38	5530.51	6414.08	7363.10
3681.55	4454.68	5301.43	6221.82	7215.84	8283.49
4090.61	4949.64	5890.48	6913.13	8017.60	9203.88

Y_{CU} (given ϕ = 16 in.)	Y_{CU} (given ϕ = 17 in.)	Y_{CU} (given ϕ = 18 in.)	Y_{CU} (given ϕ = 19 in.)	Y_{CU} (given ϕ = 20 in.)	Y_{CU} (given ϕ = 21 in.)
1047.20	1182.19	1325.36	1476.71	1636.24	1803.96
2094.39	2364.37	2650.72	2953.42	3272.49	3607.92
3141.59	3546.56	3976.07	4430.13	4908.73	5411.88
4188.79	4728.75	5301.43	5906.84	6544.98	7215.84
5235.98	5910.93	6626.79	7383.55	8181.22	9019.80
6283.18	7093.12	7952.15	8860.27	9817.47	10823.76
7330.38	8275.31	9277.51	10336.98	11453.71	12627.72
8377.57	9457.49	10602.87	11813.69	13089.96	14431.68
9424.77	10639.68	11928.22	13290.40	14726.20	16235.64
10471.97	11821.87	13253.58	14767.11	16362.45	18039.60

Continued

Y_{CU} (given ϕ = 22 in.)	Y_{CU} (given ϕ = 23 in.)	Y_{CU} (given ϕ = 24 in.)	Y_{CU} (given ϕ = 25 in.)	Y_{CU} (given ϕ = 26 in.)	Y_{CU} (given ϕ = 27 in.)
1979.86	2163.93	2356.19	2556.63	2765.25	2982.06
3959.71	4327.87	4712.38	5113.26	5530.51	5964.11
5939.57	6491.80	7068.58	7669.90	8295.76	8946.17
7919.42	8655.73	9424.77	10226.53	11061.01	11928.22
9899.28	10819.67	11780.96	12783.16	13826.27	14910.28
11879.14	12983.60	14137.16	15339.80	16591.52	17892.34
13858.99	15147.54	16493.35	17896.43	19356.78	20874.39
15838.85	17311.47	18849.54	20453.06	22122.03	23856.45
17818.71	19475.40	21205.73	23009.69	24887.28	26838.51
19798.56	21639.34	23561.93	25566.33	27652.54	29820.56

Y_{CU} (given ϕ = 28 in.)	Y_{CU} (given ϕ = 29 in.)	Y_{CU} (given ϕ = 30 in.)	Y_{CU} (given ϕ = 31 in.)	Y_{CU} (given ϕ = 32 in.)	Y_{CU} (given ϕ = 33 in.)
3207.04	3440.20	3681.55	3931.08	4188.79	4454.68
6414.08	6880.41	7363.10	7862.16	8377.57	8909.35
9621.12	10320.61	11044.65	11793.23	12566.36	13364.03
12828.16	13760.82	14726.20	15724.31	16755.15	17818.71
16035.20	17201.02	18407.75	19655.39	20943.93	22273.38
19242.24	20641.23	22089.31	23586.47	25132.72	26728.06
22449.28	24081.43	25770.86	27517.55	29321.51	31182.74
25656.32	27521.64	29452.41	31448.63	33510.29	35637.41
28863.36	30961.84	33133.96	35379.70	37699.08	40092.09
32070.40	34402.05	36815.51	39310.78	41887.87	44546.76

Y_{CU} (given ϕ = 34 in.)	Y_{CU} (given ϕ = 35 in.)	Y_{CU} (given ϕ = 36 in.)	Y_{CU} (given ϕ = 37 in.)	Y_{CU} (given ϕ = 38 in.)	Y_{CU} (given ϕ = 39 in.)
4728.75	5011.00	5301.43	5600.05	5906.84	6221.82
9457.49	10022.00	10602.87	11200.10	11813.69	12443.64
14186.24	15033.00	15904.30	16800.14	17720.53	18665.46
18914.99	20044.00	21205.73	22400.19	23627.37	24887.28
23643.74	25055.00	26507.17	28000.24	29534.22	31109.10
28372.49	30066.00	31808.60	33600.29	35441.06	37330.93
33101.23	35077.00	37110.03	39200.34	41347.91	43552.75
37829.98	40088.00	42411.47	44800.38	47254.75	49774.57
42558.73	45099.00	47712.90	50400.43	53161.59	55996.39
47287.48	50110.00	53014.33	56000.48	59068.44	62218.21

Y_{CU} (given ϕ = 40 in.)	Y_{CU} (given ϕ = 41 in.)	Y_{CU} (given ϕ = 42 in.)	Y_{CU} (given ϕ = 43 in.)	Y_{CU} (given ϕ = 44 in.)	Y_{CU} (given ϕ = 45 in.)
6544.98	6876.32	7215.84	7563.54	7919.42	8283.49
13089.96	13752.64	14431.68	15127.08	15838.85	16566.98
19634.94	20628.96	21647.52	22690.62	23758.27	24850.47
26179.92	27505.27	28863.36	30254.17	31677.70	33133.96
32724.90	34381.59	36079.20	37817.71	39597.12	41417.45
39269.87	41257.91	43295.04	45381.25	47516.55	49700.94
45814.85	48134.23	50510.88	52944.79	55435.97	57984.43
52359.83	55010.55	57726.72	60508.33	63355.40	66267.91
58904.81	61886.87	64942.56	68071.87	71274.82	74551.40
65449.79	68763.19	72158.40	75635.42	79194.25	82834.89

Table 4

CUTTER COSTS FOR MEDIUM HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

$$Y_{CU} = \pi \frac{\phi^2}{4} DC_H$$

Where:

Y_{CU} = Cutter cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\ \phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

C_H = Cost per foot of linear cut as a function of the geological medium equal to $1.00 in the below calculations for medium hard rock.

Y_{CU} (given ϕ = 10 in.)	Y_{CU} (given ϕ = 11 in.)	Y_{CU} (given ϕ = 12 in.)	Y_{CU} (given ϕ = 13 in.)	Y_{CU} (given ϕ = 14 in.)	Y_{CU} (given ϕ = 15 in.)
545.41	659.95	785.40	921.75	1069.01	1227.18
1090.83	1319.90	1570.79	1843.50	2138.03	2454.37
1636.24	1979.86	2356.19	2765.25	3207.04	3681.55
2181.66	2639.81	3141.59	3687.00	4276.05	4908.73
2727.07	3299.76	3926.99	4608.76	5345.07	6135.92
3272.49	3959.71	4712.38	5530.51	6414.08	7363.10
3817.90	4619.66	5497.78	6452.26	7483.09	8590.29
4363.32	5279.62	6283.18	7374.01	8552.11	9817.47
4908.73	5939.57	7068.58	8295.76	9621.12	11044.65
5454.15	6599.52	7853.97	9217.51	10690.13	12271.84

Y_{CU} (given ϕ = 16 in.)	Y_{CU} (given ϕ = 17 in.)	Y_{CU} (given ϕ = 18 in.)	Y_{CU} (given ϕ = 19 in.)	Y_{CU} (given ϕ = 20 in.)	Y_{CU} (given ϕ = 21 in.)
1396.26	1576.25	1767.14	1968.95	2181.66	2405.28
2792.52	3152.50	3534.29	3937.90	4363.32	4810.56
4188.79	4728.75	5301.43	5906.84	6544.98	7215.84
5585.05	6305.00	7068.58	7875.79	8726.64	9621.12
6981.31	7881.25	8835.72	9844.74	10908.30	12026.40
8377.57	9457.50	10602.87	11813.69	13089.96	14431.68
9773.84	11033.74	12370.01	13782.64	15271.62	16836.96
11170.10	12609.99	14137.16	15751.58	17453.28	19242.24
12566.36	14186.24	15904.30	17720.53	19634.94	21647.52
13962.62	15762.49	17671.44	19689.48	21816.60	24052.80

Continued

Y_{CU} (given ϕ = 22 in.)	Y_{CU} (given ϕ = 23 in.)	Y_{CU} (given ϕ = 24 in.)	Y_{CU} (given ϕ = 25 in.)	Y_{CU} (given ϕ = 26 in.)	Y_{CU} (given ϕ = 27 in.)
2639.81	2885.24	3141.59	3408.84	3687.00	3976.07
5279.62	5770.49	6283.18	6817.69	7374.01	7952.15
7919.42	8655.73	9424.77	10226.53	11061.01	11928.22
10559.23	11540.98	12566.36	13635.37	14748.02	15904.30
13199.04	14426.22	15707.95	17044.22	18435.02	19880.37
15838.85	17311.47	18849.54	20453.06	22122.03	23856.45
18478.66	20196.71	21991.13	23861.90	25809.03	27832.52
21118.47	23081.96	25132.72	27270.75	29496.04	31808.60
23758.27	25967.21	28274.31	30679.59	33183.04	35784.67
26398.08	28852.45	31415.90	34088.43	36870.05	39760.75

Y_{CU} (given ϕ = 28 in.)	Y_{CU} (given ϕ = 29 in.)	Y_{CU} (given ϕ = 30 in.)	Y_{CU} (given ϕ = 31 in.)	Y_{CU} (given ϕ = 32 in.)	Y_{CU} (given ϕ = 33 in.)
4276.05	4586.94	4908.73	5241.44	5585.05	5939.57
8552.11	9173.88	9817.47	10482.87	11170.10	11879.14
12828.16	13760.82	14726.20	15724.31	16755.15	17818.71
17104.21	18347.76	19634.94	20965.75	22340.20	23758.27
21380.27	22934.70	24543.67	26207.19	27925.24	29697.84
25656.32	27521.64	29452.41	31448.63	33510.29	35637.41
29932.37	32108.58	34361.14	36690.06	39095.34	41576.98
34208.43	36695.52	39269.87	41931.50	44680.39	47516.55
38484.48	41282.46	44178.61	47172.94	50265.44	53456.12
42760.53	45869.39	49087.34	52414.38	55850.49	59395.69

Y_{CU} (given ϕ = 34 in.)	Y_{CU} (given ϕ = 35 in.)	Y_{CU} (given ϕ = 36 in.)	Y_{CU} (given ϕ = 37 in.)	Y_{CU} (given ϕ = 38 in.)	Y_{CU} (given ϕ = 39 in.)
6305.00	6681.33	7068.58	7466.73	7875.79	8295.76
12609.99	13362.67	14137.16	14933.46	15751.58	16591.52
18914.99	20044.00	21205.73	22400.19	23627.37	24887.28
25219.99	26725.33	28274.31	29866.92	31503.17	33183.04
31524.98	33406.66	35342.89	37333.65	39378.96	41478.81
37829.98	40088.00	42411.47	44800.38	47254.75	49774.57
44134.98	46769.33	49480.04	52267.11	55130.54	58070.33
50439.97	53450.66	56548.62	59733.84	63006.33	66366.09
56744.97	60132.00	63617.20	67200.57	70882.12	74661.85
63049.97	66813.33	70685.78	74667.31	78757.91	82957.61

Y_{CU} (given ϕ = 40 in.)	Y_{CU} (given ϕ = 41 in.)	Y_{CU} (given ϕ = 42 in.)	Y_{CU} (given ϕ = 43 in.)	Y_{CU} (given ϕ = 44 in.)	Y_{CU} (given ϕ = 45 in.)
8726.64	9168.42	9621.12	10084.72	10559.23	11044.65
17453.28	18336.85	19242.24	20169.44	21118.47	22089.30
26179.92	27505.27	28863.36	30254.17	31677.70	33133.96
34906.56	36673.70	38484.48	40338.39	42236.93	44178.61
43633.19	45842.13	48105.60	50423.61	52796.17	55223.26
52359.83	55010.55	57726.72	60508.33	63355.40	66267.91
61086.47	64178.98	67347.84	70593.05	73914.63	77312.57
69813.11	73347.40	76968.96	80677.78	84473.86	88357.22
78539.75	82515.82	86590.07	90762.50	95033.10	99401.87
87266.39	91684.25	96211.20	100847.22	105592.33	110446.52

Table 5

CUTTER COSTS FOR HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

$$Y_{CU} = \pi \frac{\phi^2}{4} DC_H$$

Where:

Y_{CU} = Cutter cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\ \phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

C_H = Cost per foot of linear cut as a function of the geological medium equal to $1.50 in the below calculations for hard rock.

Y_{CU} (given ϕ = 10 in.)	Y_{CU} (given ϕ = 11 in.)	Y_{CU} (given ϕ = 12 in.)	Y_{CU} (given ϕ = 13 in.)	Y_{CU} (given ϕ = 14 in.)	Y_{CU} (given ϕ = 15 in.)
818.12	989.93	1178.10	1382.63	1603.52	1840.78
1636.24	1979.86	2356.19	2765.25	3207.04	3681.55
2454.37	2969.78	3534.29	4147.88	4810.56	5522.33
3272.49	3959.71	4712.38	5530.51	6414.08	7363.10
4090.61	4949.64	5890.48	6913.13	8017.60	9203.88
4908.73	5939.57	7068.58	8295.76	9621.12	11044.65
5726.86	6929.50	8246.67	9678.39	11224.64	12885.43
6544.98	7919.42	9424.77	11061.01	12828.16	14726.20
7363.10	8909.35	10602.87	12443.64	14431.68	16566.98
8181.22	9899.28	11780.96	13826.27	16035.20	18407.75

Y_{CU} (given ϕ = 16 in.)	Y_{CU} (given ϕ = 17 in.)	Y_{CU} (given ϕ = 18 in.)	Y_{CU} (given ϕ = 19 in.)	Y_{CU} (given ϕ = 20 in.)	Y_{CU} (given ϕ = 21 in.)
2094.39	2364.37	2650.72	2953.42	3272.49	3607.92
4188.79	4728.75	5301.43	5906.84	6544.98	7215.84
6283.18	7093.12	7952.15	8860.27	9817.47	10823.76
8377.57	9457.49	10602.87	11813.69	13089.96	14431.68
10471.97	11821.87	13253.58	14767.11	16362.45	18039.60
12566.36	14186.24	15904.30	17720.53	19634.94	21647.52
14660.75	16550.62	18555.02	20673.95	22907.43	25255.44
16755.15	18914.99	21205.73	23627.37	26179.92	28863.36
18849.54	21279.36	23856.45	26580.80	29452.41	32471.28
20943.93	23643.74	26507.17	29534.22	32724.90	36079.20

Continued

Y_{CU} (given ϕ = 22 in.)	Y_{CU} (given ϕ = 23 in.)	Y_{CU} (given ϕ = 24 in.)	Y_{CU} (given ϕ = 25 in.)	Y_{CU} (given ϕ = 26 in.)	Y_{CU} (given ϕ = 27 in.)
3959.71	4327.87	4712.38	5113.26	5530.51	5964.11
7919.42	8655.73	9424.77	10226.53	11061.01	11928.22
11879.14	12983.60	14137.16	15339.80	16591.52	17892.34
15838.85	17311.47	18849.54	20453.06	22122.03	23856.45
19798.56	21639.34	23561.93	25566.33	27652.54	29820.56
23758.27	25967.21	28274.31	30679.59	33183.04	35784.67
27717.99	30295.07	32986.70	35792.86	38713.55	41748.79
31677.70	34622.94	37699.08	40906.12	44244.06	47712.90
35637.41	38950.81	42411.47	46019.39	49774.57	53677.01
39597.12	43278.67	47123.85	51132.65	55305.07	59641.12

Y_{CU} (given ϕ = 28 in.)	Y_{CU} (given ϕ = 29 in.)	Y_{CU} (given ϕ = 30 in.)	Y_{CU} (given ϕ = 31 in.)	Y_{CU} (given ϕ = 32 in.)	Y_{CU} (given ϕ = 33 in.)
6414.08	6880.41	7363.10	7862.16	8377.57	8909.35
12828.16	13760.82	14726.20	15724.31	16755.15	17818.71
19242.24	20641.23	22089.31	23586.47	25132.72	26728.06
25656.32	27521.64	29452.41	31448.63	33510.29	35637.41
32070.40	34402.05	36815.51	39310.78	41887.87	44546.76
38484.48	41282.46	44178.61	47172.94	50265.44	53456.12
44898.56	48162.87	51541.71	55035.09	58643.01	62365.47
51312.64	55043.27	58904.81	62897.25	67020.59	71274.82
57726.72	61923.68	66267.91	70759.41	75398.16	80184.18
64140.80	68804.09	73631.02	78621.56	83775.73	89093.53

Y_{CU} (given ϕ = 34 in.)	Y_{CU} (given ϕ = 35 in.)	Y_{CU} (given ϕ = 36 in.)	Y_{CU} (given ϕ = 37 in.)	Y_{CU} (given ϕ = 38 in.)	Y_{CU} (given ϕ = 39 in.)
9457.49	10022.00	10602.87	11200.10	11813.69	12443.64
18914.99	20044.00	21205.73	22400.19	23627.37	24887.28
28372.49	30066.00	31808.60	33600.29	35441.06	37330.93
37829.98	40088.00	42411.47	44800.38	47254.75	49774.57
47287.48	50110.00	53014.33	56000.48	59068.44	62218.21
56744.97	60132.00	63617.20	67200.58	70882.12	74661.85
66202.47	70154.00	74220.06	78400.67	82695.81	87105.49
75659.96	80176.00	84822.93	89600.77	94509.50	99549.13
85117.45	90197.99	95425.80	100800.86	106323.19	111992.77
94574.95	100219.99	106028.66	112000.96	118136.87	124436.42

Y_{CU} (given ϕ = 40 in.)	Y_{CU} (given ϕ = 41 in.)	Y_{CU} (given ϕ = 42 in.)	Y_{CU} (given ϕ = 43 in.)	Y_{CU} (given ϕ = 44 in.)	Y_{CU} (given ϕ = 45 in.)
13089.96	13752.64	14431.68	15127.08	15838.85	16566.98
26179.92	27505.27	28863.36	30254.17	31677.70	33133.96
39269.87	41257.91	43295.04	45381.25	47516.55	49700.94
52359.83	55010.55	57726.72	60508.33	63355.40	66267.91
65449.79	68763.19	72158.40	75635.42	79194.25	82834.89
78539.75	82515.83	86590.07	90762.50	95033.10	99401.87
91629.71	96268.46	101021.75	105889.58	110871.95	115968.85
104719.67	110021.10	115453.43	121016.67	126710.80	132535.83
117809.63	123773.74	129885.11	136143.75	142549.65	149102.81
130899.58	137526.37	144316.79	151270.83	158388.50	165669.79

Table 6

CUTTER COSTS FOR VERY HARD ROCK

AS A FUNCTION OF DEPTH AND DIAMETER

(in dollars)

$$Y_{CU} = \pi \frac{\phi^2}{4} DC_H$$

Where:

Y_{CU} = Cutter cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

C_H = Cost per foot of linear cut as a function of the geological medium equal to $2.00 in the below calculations for very hard rock.

Y_{CU} (given ϕ = 10 in.)	Y_{CU} (given ϕ = 11 in.)	Y_{CU} (given ϕ = 12 in.)	Y_{CU} (given ϕ = 13 in.)	Y_{CU} (given ϕ = 14 in.)	Y_{CU} (given ϕ = 15 in.)
1090.83	1319.90	1570.79	1843.50	2138.03	2454.37
2181.66	2639.81	3141.59	3687.00	4276.05	4908.73
3272.49	3959.71	4712.38	5530.51	6414.08	7363.10
4363.32	5279.62	6283.18	7374.01	8552.11	9817.47
5454.15	6599.52	7853.97	9217.51	10690.13	12271.84
6544.98	7919.42	9424.77	11061.01	12828.16	14726.20
7635.81	9239.33	10995.57	12904.52	14966.19	17180.57
8726.64	10559.23	12566.36	14748.02	17104.21	19634.94
9817.47	11879.14	14137.16	16591.52	19242.24	22089.30
10908.30	13199.04	15707.95	18435.02	21380.27	24543.67

Y_{CU} (given ϕ = 16 in.)	Y_{CU} (given ϕ = 17 in.)	Y_{CU} (given ϕ = 18 in.)	Y_{CU} (given ϕ = 19 in.)	Y_{CU} (given ϕ = 20 in.)	Y_{CU} (given ϕ = 21 in.)
2792.52	3152.50	3534.29	3937.90	4363.32	4810.56
5585.05	6305.00	7068.58	7875.79	8726.64	9621.12
8377.57	9457.50	10602.87	11813.69	13089.96	14431.68
11170.10	12609.99	14137.16	15751.58	17453.28	19242.24
13962.62	15762.49	17671.44	19689.48	21816.60	24052.80
16755.15	18914.99	21205.73	23627.37	26179.92	28863.36
19547.67	22067.49	24740.02	27565.27	30543.24	33673.92
22340.20	25219.99	28274.31	31503.17	34906.56	38484.48
25132.72	28372.48	31808.60	35441.06	39269.87	43295.04
27925.24	31524.98	35342.89	39378.96	43633.19	48105.60

Continued

Y_{CU} (given ϕ = 22 in.)	Y_{CU} (given ϕ = 23 in.)	Y_{CU} (given ϕ = 24 in.)	Y_{CU} (given ϕ = 25 in.)	Y_{CU} (given ϕ = 26 in.)	Y_{CU} (given ϕ = 27 in.)
5279.62	5770.49	6283.18	6817.69	7374.01	7952.15
10559.23	11540.98	12566.36	13635.37	14748.02	15904.30
15838.85	17311.47	18849.54	20453.06	22122.03	23856.45
21118.47	23081.96	25132.72	27270.75	29496.04	31808.60
26398.08	28852.45	31415.90	34088.43	36870.05	39760.75
31677.70	34622.94	37699.08	40906.12	44244.06	47712.90
36957.32	40393.43	43982.26	47723.81	51618.07	55665.05
42236.93	46163.92	50265.44	54541.49	58992.08	63617.20
47516.55	51934.41	56548.62	61359.18	66366.09	71569.35
52796.17	57704.90	62831.80	68176.87	73740.10	79521.50

Y_{CU} (given ϕ = 28 in.)	Y_{CU} (given ϕ = 29 in.)	Y_{CU} (given ϕ = 30 in.)	Y_{CU} (given ϕ = 31 in.)	Y_{CU} (given ϕ = 32 in.)	Y_{CU} (given ϕ = 33 in.)
8552.11	9173.88	9817.47	10482.87	11170.10	11879.14
17104.21	18347.76	19634.94	20965.75	22340.20	23758.27
25656.32	27521.64	29452.41	31448.63	33510.29	35637.41
34208.43	36695.52	39269.87	41931.50	44680.39	47516.55
42760.53	45869.39	49087.34	52414.38	55850.49	59395.69
51312.64	55043.27	58904.81	62897.25	67020.59	71274.82
59864.74	64217.15	68722.28	73380.13	78190.68	83153.96
68416.85	73391.03	78539.75	83863.00	89360.78	95033.10
76968.96	82564.91	88357.22	94345.88	100530.88	106912.23
85521.06	91738.79	98174.69	104828.75	111700.98	118791.37

Y_{CU} (given ϕ = 34 in.)	Y_{CU} (given ϕ = 35 in.)	Y_{CU} (given ϕ = 36 in.)	Y_{CU} (given ϕ = 37 in.)	Y_{CU} (given ϕ = 38 in.)	Y_{CU} (given ϕ = 39 in.)
12609.99	13362.67	14137.16	14933.46	15751.58	16591.52
25219.99	26725.33	28274.31	29866.92	31503.17	33183.04
37829.98	40088.00	42411.47	44800.38	47254.75	49774.57
50439.97	53450.66	56548.62	59733.84	63006.33	66366.09
63049.97	66813.33	70685.78	74667.31	78757.91	82957.61
75659.96	80176.00	84822.93	89600.77	94509.50	99549.13
88269.95	93538.66	98960.09	104534.23	110261.08	116140.65
100879.94	106901.33	113097.24	119467.69	126012.66	132732.18
113489.94	120263.99	127234.40	134401.15	141764.25	149323.70
126099.93	133626.66	141371.55	149334.61	157515.83	165915.22

Y_{CU} (given ϕ = 40 in.)	Y_{CU} (given ϕ = 41 in.)	Y_{CU} (given ϕ = 42 in.)	Y_{CU} (given ϕ = 43 in.)	Y_{CU} (given ϕ = 44 in.)	Y_{CU} (given ϕ = 45 in.)
17453.28	18336.85	19242.24	20169.44	21118.47	22089.30
34906.56	36673.70	38484.48	40338.89	42236.93	44178.61
52359.83	55010.55	57726.72	60508.33	63355.40	66267.91
69813.11	73347.40	76968.96	80677.78	84473.86	88357.22
87266.39	91684.25	96211.20	100847.22	105592.33	110446.52
104719.67	110021.10	115453.43	121016.66	126710.80	132535.83
122172.95	128357.95	134695.67	141186.11	147829.26	154625.13
139626.22	146694.80	153937.91	161355.55	168947.73	176714.44
157079.50	165031.65	173180.15	181525.00	190066.19	198803.74
174532.78	183368.50	192422.39	201694.44	211184.66	220893.05

Table 7

CASING COSTS AS A FUNCTION OF DEPTH AND DIAMETER

$$Y_{CAS} = \left[7,500 + 1,625\left(\frac{2}{3}\phi - 10\right)\right]\frac{D}{1,000}$$

Where:

Y_{CAS} = Casing cost per well;

ϕ = Diameter of the well in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations.

Y_{CAS} (given ϕ = 10 in.)	Y_{CAS} (given ϕ = 11 in.)	Y_{CAS} (given ϕ = 12 in.)	Y_{CAS} (given ϕ = 13 in.)	Y_{CAS} (given ϕ = 14 in.)	Y_{CAS} (given ϕ = 15 in.)
2083.33	3166.67	4250.00	5333.33	6416.67	7500.00
4166.67	6333.33	8500.00	10666.67	12833.33	15000.00
6250.00	9500.00	12750.00	16000.00	19250.00	22500.00
8333.33	12666.67	17000.00	21333.33	25666.67	30000.00
10416.67	15833.33	21250.00	26666.67	32083.33	37500.00
12500.00	19000.00	25500.00	32000.00	38500.00	45000.00
14583.33	22166.67	29750.00	37333.33	44916.67	52500.00
16666.67	25333.33	34000.00	42666.67	51333.33	60000.00
18750.00	28500.00	38250.00	48000.00	57750.00	67500.00
20833.33	31666.67	42500.00	53333.33	64166.67	75000.00

Y_{CAS} (given ϕ = 16, in.)	Y_{CAS} (given ϕ = 17 in.)	Y_{CAS} (given ϕ = 18 in.)	Y_{CAS} (given ϕ = 19 in.)	Y_{CAS} (given ϕ = 20 in.)	Y_{CAS} (given ϕ = 21 in.)
8583.33	9666.67	10750.00	11833.33	12916.67	14000.00
17166.67	19333.33	21500.00	23666.67	25833.33	28000.00
25750.00	29000.00	32250.00	35500.00	38750.00	42000.00
34333.33	38666.67	43000.00	47333.33	51666.67	56000.00
42916.67	48333.33	53750.00	59166.67	64583.33	70000.00
51500.00	58000.00	64500.00	71000.00	77500.00	84000.00
60083.33	67666.67	75250.00	82833.33	90416.67	98000.00
68666.67	77333.33	86000.00	94666.67	103333.33	112000.00
77250.00	87000.00	96750.00	106500.00	116250.00	126000.00
85833.33	96666.67	107500.00	118333.33	129166.67	140000.00

Y_{CAS} (given ϕ = 22 in.)	Y_{CAS} (given ϕ = 23 in.)	Y_{CAS} (given ϕ = 24 in.)	Y_{CAS} (given ϕ = 25 in.)	Y_{CAS} (given ϕ = 26 in.)	Y_{CAS} (given ϕ = 27 in.)
15083.33	16166.67	17250.00	18333.33	19416.67	20500.00
30166.67	32333.33	34500.00	36666.67	38833.33	41000.00
45250.00	48500.00	51750.00	55000.00	58250.00	61500.00
60333.33	64666.67	69000.00	73333.33	77666.67	82000.00
75416.67	80833.33	86250.00	91666.67	97083.33	102500.00
90500.00	97000.00	103500.00	110000.00	116500.00	123000.00
105583.33	113166.67	120750.00	128333.34	135916.67	143500.00
120666.67	129333.33	138000.00	146666.67	155333.33	164000.00
135750.00	145500.00	155250.00	165000.00	174750.00	184500.00
150833.33	161666.67	172500.00	183333.34	194166.67	205000.00

Y_{CAS} (given ϕ = 28 in.)	Y_{CAS} (given ϕ = 29 in.)	Y_{CAS} (given ϕ = 30 in.)	Y_{CAS} (given ϕ = 31 in.)	Y_{CAS} (given ϕ = 32 in.)	Y_{CAS} (given ϕ = 33 in.)
21583.33	22666.67	23750.00	24833.33	25916.67	27000.00
43166.67	45333.33	47500.00	49666.67	51833.33	54000.00
64750.00	68000.00	71250.00	74500.00	77750.00	81000.00
86333.33	90666.67	95000.00	99333.33	103666.67	108000.00
107916.67	113333.33	118750.00	124166.67	129583.33	135000.00
129500.00	136000.00	142500.00	149000.00	155500.00	162000.00
151083.33	158666.67	166250.00	173833.33	181416.67	189000.00
172666.67	181333.33	190000.00	198666.67	207333.33	216000.00
194250.00	204000.00	213750.00	223500.00	233250.00	243000.00
215833.34	226666.67	237500.00	248333.34	259166.67	270000.00

Y_{CAS} (given ϕ = 34 in.)	Y_{CAS} (given ϕ = 35 in.)	Y_{CAS} (given ϕ = 36 in.)	Y_{CAS} (given ϕ = 37 in.)	Y_{CAS} (given ϕ = 38 in.)	Y_{CAS} (given ϕ = 39 in.)
28083.33	29166.67	30250.00	31333.33	32416.67	33500.00
56166.67	58333.33	60500.00	62666.67	64833.33	67000.00
84250.00	87500.00	90750.00	94000.00	97250.00	100500.00
112333.33	116666.67	121000.00	125333.33	129666.67	134000.00
140416.67	145833.33	151250.00	156666.67	162083.33	167500.00
168500.00	175000.00	181500.00	188000.00	194500.00	201000.00
196583.33	204166.67	211750.00	219333.33	226916.66	234500.00
224666.67	233333.33	242000.00	250666.67	259333.33	268000.00
252750.00	262500.00	272250.00	282000.00	291750.00	301500.00
280833.34	291666.66	302500.00	313333.34	324166.66	335000.00

Y_{CAS} (given ϕ = 40 in.)	Y_{CAS} (given ϕ = 41 in.)	Y_{CAS} (given ϕ = 42 in.)	Y_{CAS} (given ϕ = 43 in.)	Y_{CAS} (given ϕ = 44 in.)	Y_{CAS} (given ϕ = 45 in.)
34583.33	35666.67	36750.00	37833.33	38916.67	40000.00
69166.67	71333.33	73500.00	75666.67	77833.33	80000.00
103750.00	107000.00	110250.00	113500.00	116750.00	120000.00
138333.33	142666.67	147000.00	151333.33	155666.67	160000.00
172916.67	178333.33	183750.00	189166.67	194583.33	200000.00
207500.00	214000.00	220500.00	227000.00	233500.00	240000.00
242083.34	249666.67	257250.00	264833.34	272416.67	280000.00
276666.67	285333.33	294000.00	302666.67	311333.33	320000.00
311250.00	321000.00	330750.00	340500.00	350250.00	360000.00
345833.34	356666.66	367500.00	378333.33	389166.66	400000.00

Table 8

CEMENTING COSTS PER WELL

AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

$$Y_C = 1.30\left(\frac{5}{9}\pi \; P \frac{\phi^2}{4} D\right)$$

Where:

Y_C = Cementing cost per well;

P = Price of cementing material equal to \$2 per cubic foot, in our calculations;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID$\approx\frac{2}{3}\phi$;

D = Depth in feet ranging from 1,000 to 10,000 feet in our calculations.

Y_C (given ϕ = 10 in.)	Y_C (given ϕ = 11 in.)	Y_C (given ϕ = 12 in.)	Y_C (given ϕ = 13 in.)	Y_C (given ϕ = 14 in.)	Y_C (given ϕ = 15 in.)
787.82	953.26	1134.46	1331.42	1544.13	1772.60
1575.64	1906.53	2268.93	2662.84	3088.26	3545.20
2363.46	2859.79	3403.39	3994.26	4632.39	5317.80
3151.29	3813.06	4537.85	5325.67	6176.52	7090.39
3939.11	4766.32	5672.32	6657.09	7720.65	8862.99
4726.93	5719.58	6806.78	7988.51	9264.78	10635.59
5514.75	6672.85	7941.24	9319.93	10808.91	12408.19
6302.57	7626.11	9075.70	10651.35	12353.04	14180.79
7090.39	8579.38	10210.17	11982.77	13897.17	15953.39
7878.22	9532.64	11344.63	13314.18	15441.30	17725.99

Y_C (given ϕ = 16 in.)	Y_C (given ϕ = 17 in.)	Y_C (given ϕ = 18 in.)	Y_C (given ϕ = 19 in.)	Y_C (given ϕ = 20 in.)	Y_C (given ϕ = 21 in.)
2016.82	2276.80	2552.54	2844.04	3151.29	3474.29
4033.65	4553.61	5105.08	5688.07	6302.57	6948.59
6050.47	6830.41	7657.63	8532.11	9453.86	10422.88
8067.29	9107.22	10210.17	11376.14	12605.15	13897.17
10084.12	11384.02	12762.71	14220.18	15756.43	17371.47
12100.94	13660.83	15315.25	17064.21	18907.72	20845.76
14117.76	15937.63	17867.79	19908.25	22059.00	24320.05
16134.59	18214.43	20420.34	22752.29	25210.29	27794.34
18151.41	20491.24	22972.88	25596.32	28361.58	31268.64
20168.23	22768.04	25525.42	28440.36	31512.86	34742.93

Continued

Y_C (given ϕ = 22 in.)	Y_C (given ϕ = 23 in.)	Y_C (given ϕ = 24 in.)	Y_C (given ϕ = 25 in.)	Y_C (given ϕ = 26 in.)	Y_C (given ϕ = 27 in.)
3813.06	4167.58	4537.85	4923.88	5325.67	5743.22
7626.11	8335.15	9075.70	9847.77	10651.35	11486.44
11439.17	12502.73	13613.56	14771.65	15977.02	17229.66
15252.23	16670.30	18151.41	19695.54	21302.69	22972.88
19065.28	20837.88	22689.26	24619.42	26628.37	28716.10
22878.34	25005.46	27227.11	29543.31	31954.04	34459.32
26691.39	29173.03	31764.97	34467.19	37279.72	40202.53
30504.45	33340.61	36302.82	39391.08	42605.39	45945.75
34317.51	37508.19	40840.67	44314.96	47931.06	51688.97
38130.56	41675.76	45378.52	49238.85	53256.74	57432.19

Y_C (given ϕ = 28 in.)	Y_C (given ϕ = 29 in.)	Y_C (given ϕ = 30 in.)	Y_C (given ϕ = 31 in.)	Y_C (given ϕ = 32 in.)	Y_C (given ϕ = 33 in.)
6176.52	6625.58	7090.39	7570.97	8067.29	8579.38
12353.04	13251.16	14180.79	15141.93	16134.59	17158.75
18529.56	19876.74	21271.18	22712.90	24201.88	25738.13
24706.08	26502.32	28361.58	30283.86	32269.17	34317.51
30882.61	33127.90	35451.97	37854.83	40336.46	42896.88
37059.13	39753.48	42542.37	45425.79	48403.76	51476.26
43235.65	46379.06	49632.76	52996.76	56471.05	60055.64
49412.17	53004.63	56723.15	60567.72	64538.34	68635.02
55588.69	59630.21	63813.55	68138.69	72605.63	77214.39
61765.21	66255.79	70903.94	75709.65	80672.93	85793.77

Y_C (given ϕ = 34 in.)	Y_C (given ϕ = 35 in.)	Y_C (given ϕ = 36 in.)	Y_C (given ϕ = 37 in.)	Y_C (given ϕ = 38 in.)	Y_C (given ϕ = 39 in.)
9107.22	9650.81	10210.17	10785.28	11376.14	11982.77
18214.43	19301.63	20420.34	21570.55	22752.29	23965.53
27321.65	28952.44	30630.50	32355.83	34128.43	35948.30
36428.87	38603.26	40840.67	43141.11	45504.57	47931.06
45536.09	48254.07	51050.84	53926.39	56880.72	59913.83
54643.30	57904.88	61261.01	64711.67	68256.86	71896.60
63750.52	67555.70	71471.17	75496.94	79633.00	33879.36
72857.74	77206.51	81681.34	86282.22	91009.15	95862.13
81964.96	86857.33	91891.51	97067.50	102385.29	107844.89
91072.17	96508.14	102101.68	107852.77	113761.43	119827.66

Y_C (given ϕ = 40 in.)	Y_C (given ϕ = 41 in.)	Y_C (given ϕ = 42 in.)	Y_C (given ϕ = 43 in.)	Y_C (given ϕ = 44 in.)	Y_C (given ϕ = 45 in.)
12605.15	13243.28	13897.17	14566.82	15252.23	15953.39
25210.29	26486.56	27794.34	29133.64	30504.45	31906.77
37815.44	39729.84	41691.52	43700.46	45756.68	47860.16
50420.58	52973.12	55588.69	58267.28	61008.90	63813.55
63025.73	66216.40	69485.86	72834.10	76261.13	79766.93
75630.87	79459.68	83383.03	87400.92	91513.35	95720.32
88236.02	92702.96	97280.21	101967.74	106765.58	111673.71
100841.16	105946.24	111177.38	116534.57	122017.80	127627.09
113446.31	119189.52	125074.55	131101.39	137270.03	143580.48
126051.45	132432.81	138971.72	145668.21	152522.25	159533.87

Table 9

TOTAL RIG COSTS FOR SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER*
(in dollars)

$$Y_{RIG} = \left[\frac{DH_i(\phi+8)}{7,200} \right] (1,200 + 1,15HPR)$$

Where:

Y_{RIG} = Total rig cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

HPR = $26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$ is the rig horsepower requirement;

H_i = Factor of the hardness of the soil equal to $\frac{3}{4}$ for soft rock.

* In these calculations, this total drilling time is the result of a ratio between total depth and the corresponding penetration rate.

Y_{RIG} (given ϕ = 10 in.)	Y_{RIG} (given ϕ = 11 in.)	Y_{RIG} (given ϕ = 12 in.)	Y_{RIG} (given ϕ = 13 in.)	Y_{RIG} (given ϕ = 14 in.)	Y_{RIG} (given ϕ = 15 in.)
2250.00	2375.00	2500.00	2625.00	2750.00	2875.00
4500.00	4750.00	5000.00	5250.00	5500.00	5750.00
6750.00	7125.00	7500.00	7875.00	8250.00	8625.00
9000.00	9736.71	10498.33	11284.87	12096.33	12932.71
13406.25	14446.93	15518.75	16621.72	17755.83	18921.09
18675.00	20067.56	21497.50	22964.81	24469.50	26011.56
24806.25	26598.62	28434.58	30314.16	32237.33	34204.11
31800.00	34040.08	36330.00	38669.75	41059.33	43498.75
39656.25	42391.97	45183.75	48031.59	50935.50	53895.47
48375.00	51654.27	54995.83	58399.69	61865.83	65394.27

Y_{RIG} (given ϕ = 16 in.)	Y_{RIG} (given ϕ = 17 in.)	Y_{RIG} (given ϕ = 18 in.)	Y_{RIG} (given ϕ = 19 in.)	Y_{RIG} (given ϕ = 20 in.)	Y_{RIG} (given ϕ = 21 in.)
3000.00	3125.00	3250.00	3375.00	3500.00	3625.00
6000.00	6250.00	6500.00	6750.00	7000.00	7250.00
9000.00	9375.00	9824.75	10454.91	11103.75	11771.28
13794.00	14680.21	15591.33	16527.38	17488.33	18474.21
20117.50	21345.05	22603.75	23893.59	25214.58	26566.72
27591.00	29207.81	30862.00	32553.56	34282.50	36048.81
36214.50	38268.49	40366.08	42507.28	44692.08	46920.49
45988.00	48527.08	51116.00	53754.75	56443.33	59181.75
56911.50	59983.59	63111.75	66295.97	69536.25	72832.60
68985.00	72638.02	76353.33	80130.94	83970.83	87873.02

Y_{RIG} (given ϕ = 22 in.)	Y_{RIG} (given ϕ = 23 in.)	Y_{RIG} (given ϕ = 24 in.)	Y_{RIG} (given ϕ = 25 in.)	Y_{RIG} (given ϕ = 26 in.)	Y_{RIG} (given ϕ = 27 in.)
3750.00	3875.00	4000.00	4125.00	4250.00	4375.00
7500.00	7750.00	8000.00	8250.00	8630.33	9102.19
12457.50	13162.41	13886.00	14628.28	15389.25	16168.91
19485.00	20520.71	21581.33	22666.87	23777.33	24912.71
27950.00	29364.43	30810.00	32286.72	33794.58	35333.59
37852.50	39693.56	41572.00	43487.81	45441.00	47431.56
49192.50	51508.11	53867.33	56270.16	58716.58	61206.62
61970.00	64808.08	67696.00	70633.75	73621.33	76658.75
76185.00	79593.47	83058.00	86578.59	90155.25	93787.97
91837.50	95864.27	99953.33	104104.69	108318.33	112594.27

Y_{RIG} (given ϕ = 28 in.)	Y_{RIG} (given ϕ = 29 in.)	Y_{RIG} (given ϕ = 30 in.)	Y_{RIG} (given ϕ = 31 in.)	Y_{RIG} (given ϕ = 32 in.)	Y_{RIG} (given ϕ = 33 in.)
4500.00	4625.00	4750.00	4875.00	5000.00	5125.00
9586.50	10083.27	10592.50	11114.19	11648.33	12194.94
16967.25	17784.28	18620.00	19474.41	20347.50	21239.28
26073.00	27258.21	28468.33	29703.38	30963.33	32248.21
36903.75	38505.05	40137.50	41801.09	43495.83	45221.72
49459.50	51524.81	53627.50	55767.56	57945.00	60159.81
63740.25	66317.49	68938.33	71602.78	74310.83	77062.49
79746.00	82883.08	86070.00	89306.75	92593.33	95929.75
97476.75	101221.59	105022.50	108879.47	112792.50	116761.59
116932.50	121333.02	125795.84	130320.94	134908.33	139558.02

Y_{RIG} (given ϕ = 34 in.)	Y_{RIG} (given ϕ = 35 in.)	Y_{RIG} (given ϕ = 36 in.)	Y_{RIG} (given ϕ = 37 in.)	Y_{RIG} (given ϕ = 38 in.)	Y_{RIG} (given ϕ = 39 in.)
5370.75	5632.55	5900.58	6174.84	6455.33	6742.05
12754.00	13325.52	13909.50	14505.94	15114.83	15736.19
22149.75	23078.91	24026.75	24993.28	25978.50	26982.41
33558.00	34892.71	36252.33	37636.88	39046.33	40480.71
46978.75	48766.93	50586.25	52436.72	54318.33	56231.09
62412.00	64701.56	67028.50	69392.81	71794.50	74233.56
79857.75	82696.61	85579.08	88505.16	91474.83	94488.12
99316.00	102752.08	106238.00	109773.75	113359.33	116994.75
120786.75	124867.97	129005.25	133198.60	137448.00	141753.47
144270.00	149044.27	153880.83	158779.69	163740.83	168764.27

Y_{RIG} (given ϕ = 40 in.)	Y_{RIG} (given ϕ = 41 in.)	Y_{RIG} (given ϕ = 42 in.)	Y_{RIG} (given ϕ = 43 in.)	Y_{RIG} (given ϕ = 44 in.)	Y_{RIG} (given ϕ = 45 in.)
7035.00	7334.18	7639.58	7951.22	8269.08	8593.18
16370.00	17016.27	17675.00	18346.19	19029.83	19725.94
28005.00	29046.28	30106.25	31184.91	32282.25	33398.28
41940.00	43424.21	44933.33	46467.38	48026.33	49610.21
58175.00	60150.05	62156.25	64193.59	66262.08	68361.72
76710.00	79223.81	81775.00	84363.56	86989.50	89652.81
97545.00	100645.49	103789.58	106977.28	110208.58	113483.49
120680.00	124415.09	128200.00	132034.75	135919.33	139853.75
146115.00	150532.60	155006.25	159535.97	164121.75	168763.59
173850.00	178645.83	182291.67	185937.50	189583.33	193229.17

Table 10

TOTAL RIG COSTS FOR MEDIUM SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER*
(in dollars)

$$Y_{RIG} = \left[\frac{DH_i(\phi+8)}{7,200}\right](1,200 + 1.15HPR)$$

Where:

Y_{RIG} = Total rig cost; per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID$\approx\frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

HPR = $26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$ is the rig horsepower requirement;

H_i = Factor of the hardness of the soil equal to 1 for medium soft rock.

* In these calculations, this total drilling time is the result of a ratio between total depth and the corresponding penetration rate.

Y_{RIG} (given ϕ = 10 in.)	Y_{RIG} (given ϕ = 11 in.)	Y_{RIG} (given ϕ = 12 in.)	Y_{RIG} (given ϕ = 13 in.)	Y_{RIG} (given ϕ = 14 in.)	Y_{RIG} (given ϕ = 15 in.)
3000.00	3166.67	3333.33	3500.00	3666.67	3833.33
6000.00	6333.33	6666.67	7000.00	7333.33	7666.67
9000.00	9500.00	10000.00	10500.00	11000.00	11500.00
12000.00	12982.28	13997.78	15046.50	16128.44	17243.61
17875.00	19262.57	20691.67	22162.29	23674.44	25228.12
24900.00	26756.75	28663.33	30619.75	32626.00	34682.08
33075.00	35464.82	37912.78	40418.88	42983.11	45605.49
42400.00	45386.78	48440.00	51559.67	54745.78	57998.33
52875.00	56522.63	60245.00	64042.13	67914.00	71860.63
64500.00	68872.36	73327.78	77866.25	82487.78	87192.36

Y_{RIG} (given ϕ = 16 in.)	Y_{RIG} (given ϕ = 17 in.)	Y_{RIG} (given ϕ = 18 in.)	Y_{RIG} (given ϕ = 19 in.)	Y_{RIG} (given) ϕ = 20 in.)	Y_{RIG} (given ϕ = 21 in.)
4000.00	4166.67	4333.33	4500.00	4666.67	4833.33
8000.00	8333.33	8666.67	9000.00	9333.33	9666.67
12000.00	12500.00	13099.67	13939.88	14805.00	15695.04
18392.00	19573.61	20788.44	22036.50	23317.78	24632.28
26823.33	28460.07	30138.33	31858.13	33619.44	35422.29
36788.00	38943.75	41149.33	43404.75	45710.00	48065.08
48286.00	51024.65	53821.44	56676.38	59589.45	62560.65
61317.33	64702.78	68154.67	71673.00	75257.78	78909.00
75882.00	79978.13	84149.00	88394.62	92715.00	97110.13
91980.00	96850.70	101804.44	106841.25	111961.11	117164.03

Y_{RIG} (given ϕ = 22 in.)	Y_{RIG} (given ϕ = 23 in.)	Y_{RIG} (given ϕ = 24 in.)	Y_{RIG} (given ϕ = 25 in.)	Y_{RIG} (given ϕ = 26 in.)	Y_{RIG} (given ϕ = 27 in.)
5000.00	5166.67	5333.33	5500.00	5666.67	5833.33
10000.00	10333.33	10666.67	11000.00	11507.11	12136.25
16610.00	17549.88	18514.67	19504.38	20519.00	21558.54
25980.00	27360.94	28775.11	30222.50	31703.11	33216.94
37266.67	39152.57	41080.00	43048.96	45059.45	47111.46
50470.00	52924.75	55429.33	57983.75	60588.00	63242.08
65590.00	68677.49	71823.11	75026.87	78288.78	81608.82
82626.67	86410.78	90261.33	94178.33	98161.78	102211.67
101580.00	106124.62	110744.00	115438.13	120207.00	125050.63
122450.00	127819.03	133271.11	138806.25	144424.45	150125.69

Y_{RIG} (given ϕ = 28 in.)	Y_{RIG} (given ϕ = 29 in.)	Y_{RIG} (given ϕ = 30 in.)	Y_{RIG} (given ϕ = 31 in.)	Y_{RIG} (given ϕ = 32 in.)	Y_{RIG} (given ϕ = 33 in.)
6000.00	6166.67	6333.33	6500.00	6666.67	6833.33
12782.00	13444.36	14123.33	14818.92	15531.11	16259.92
22623.00	23712.37	24826.67	25965.88	27130.00	28319.04
34764.00	36344.28	37957.78	39604.50	41284.44	42997.61
49205.00	51340.07	53516.67	55734.79	57994.45	60295.63
65946.00	68699.75	71503.33	74356.75	77260.00	80213.08
84987.00	88423.32	91917.78	95470.38	99081.11	102749.99
106328.00	110510.78	114760.00	119075.67	123457.78	127906.33
129969.00	134962.13	140030.00	145172.63	150390.00	155682.13
155910.00	161777.36	167727.78	173761.25	179877.78	186077.36

Y_{RIG} (given ϕ = 34 in.)	Y_{RIG} (given ϕ = 35 in.)	Y_{RIG} (given ϕ = 36 in.)	Y_{RIG} (given ϕ = 37 in.)	Y_{RIG} (given ϕ = 38 in.)	Y_{RIG} (given ϕ = 39 in.)
7161.00	7510.07	7867.44	8233.12	8607.11	8989.40
17005.33	17767.36	18546.00	19341.25	20153.11	20981.58
29533.00	30771.87	32035.67	33324.38	34638.00	35976.54
44744.00	46523.61	48336.44	50182.50	52061.78	53974.28
62638.33	65022.57	67448.33	69915.63	72424.44	74974.79
83216.00	86268.75	89371.33	92523.75	95726.00	98978.08
106477.00	110262.15	114105.45	118006.88	121966.44	125984.15
132421.33	137002.78	141650.67	146365.00	151145.78	155993.00
161049.00	166490.63	172007.00	177598.13	183264.00	189004.63
192360.00	198725.69	205174.45	211706.25	218321.11	225019.02

Y_{RIG} (given ϕ = 40 in.)	Y_{RIG} (given ϕ = 41 in.)	Y_{RIG} (given ϕ = 42 in.)	Y_{RIG} (given ϕ = 43 in.)	Y_{RIG} (given ϕ = 44 in.)	Y_{RIG} (given ϕ = 45 in.)
9380.00	9778.90	10186.11	10601.63	11025.44	11457.57
21826.67	22688.36	23566.67	24461.58	25373.11	26301.25
37340.00	38728.38	40141.67	41579.88	43043.00	44531.04
55920.00	57898.94	59911.11	61956.50	64035.11	66146.94
77566.67	80200.07	82875.00	85591.46	88349.44	91148.96
102280.00	105631.75	109033.33	112484.75	115986.00	119537.08
130060.00	134193.99	138386.11	142636.38	146944.78	151311.32
160906.67	165886.78	170933.33	176046.33	181225.77	186471.67
194820.00	200710.13	206675.00	212714.63	218829.00	225018.13
231800.00	238194.44	243055.56	247916.67	252777.77	257638.89

Table 11

TOTAL RIG COSTS FOR MEDIUM HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER*
(in dollars)

$$Y_{RIG} = \left[\frac{DH_i(\phi+8)}{7,200}\right](1,200 + 1.15HPR)$$

Where:

Y_{RIG} = Total rig cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}$ ϕ;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

HPR = $26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$ is the rig horsepower requirement;

H_i = Factor of the hardness of the soil equal to $\frac{\div 3}{2.3}$ for medium hard rock.

* In these calculations, this total drilling time is the result of a ratio between total depth and the corresponding penetration rate.

Y_{RIG} (given ϕ = 10 in.)	Y_{RIG} (given ϕ = 11 in.)	Y_{RIG} (given ϕ = 12 in.)	Y_{RIG} (given ϕ = 13 in.)	Y_{RIG} (given ϕ = 14 in.)	Y_{RIG} (given ϕ = 15 in.)
3913.04	4130.43	4347.83	4565.22	4782.61	5000.00
7826.09	8260.87	8695.65	9130.43	9565.22	10000.00
11739.13	12391.30	13043.48	13695.65	14347.83	15000.00
15652.17	16933.41	18257.97	19625.87	21037.10	22491.67
23315.22	25125.09	26989.13	28907.34	30879.71	32906.25
32478.26	34900.11	37386.96	39938.80	42555.65	45237.50
43141.30	46258.46	49451.45	52720.27	56064.93	59485.42
55304.35	59200.15	63182.61	67251.74	71407.54	75650.00
68967.39	73725.16	78580.44	83533.21	88583.48	93731.25
84130.43	89833.51	95644.93	101564.67	107592.75	113729.17

Y_{RIG} (given ϕ = 16 in.)	Y_{RIG} (given ϕ = 17 in.)	Y_{RIG} (given ϕ = 18 in.)	Y_{RIG} (given ϕ = 19 in.)	Y_{RIG} (given ϕ = 20 in.)	Y_{RIG} (given ϕ = 21 in.)
5217.39	5434.78	5652.17	5869.57	6086.96	6304.35
10434.78	10869.57	11304.35	11739.13	12173.91	12608.70
15652.17	16304.35	17086.52	18182.45	19310.87	20471.79
23989.57	25530.80	27115.36	28743.26	30414.49	32129.06
34986.96	37121.83	39310.87	41554.08	43851.45	46202.99
47984.35	50796.20	53673.04	56614.89	59621.74	62693.59
62981.74	66553.90	70201.88	73925.71	77725.36	81600.85
79979.13	84394.93	88897.39	93486.52	98162.32	102924.78
98976.52	104319.29	109759.56	115297.34	120932.61	126665.38
119973.91	126326.99	132788.40	139358.15	146036.23	152822.64

Y_{RIG} (given ϕ = 22 in.)	Y_{RIG} (given ϕ = 23 in.)	Y_{RIG} (given ϕ = 24 in.)	Y_{RIG} (given ϕ = 25 in.)	Y_{RIG} (given ϕ = 26 in.)	Y_{RIG} (given ϕ = 27 in.)
6521.74	6739.13	6956.52	7173.91	7391.30	7608.70
13043.48	13478.26	13913.04	14347.83	15009.28	15829.89
21665.22	22891.14	24149.57	25440.49	26763.91	28119.84
33886.96	35688.19	37532.75	39420.65	41351.88	43326.45
48608.70	51068.57	53582.61	56150.81	58773.19	61449.73
65830.43	69032.28	72299.13	75630.98	79027.83	82489.67
85552.17	89579.33	93682.32	97861.14	102115.80	106446.29
107773.91	112709.71	117732.17	122841.30	128037.10	133319.56
132495.65	138423.42	144448.70	150571.47	156791.74	163109.51
159717.39	166720.47	173831.89	181051.63	188379.71	195816.12

Y_{RIG} (given ϕ = 28 in.)	Y_{RIG} (given ϕ = 29 in.)	Y_{RIG} (given ϕ = 30 in.)	Y_{RIG} (given ϕ = 31 in.)	Y_{RIG} (given ϕ = 32 in.)	Y_{RIG} (given ϕ = 33 in.)
7826.09	8043.48	8260.87	8478.26	8695.65	8913.04
16672.17	17536.12	18421.74	19329.32	20257.97	21208.59
29508.26	30929.18	32382.61	33868.53	35386.96	36937.38
45344.35	47405.58	49510.15	51658.04	53849.28	56083.84
64180.44	66965.31	69804.35	72697.55	75644.93	78646.47
86016.52	89608.37	93265.22	96987.07	100773.91	104625.76
110852.61	115334.76	119892.75	124526.58	129236.23	134021.72
138688.69	144144.49	149686.96	155316.09	161031.89	166834.35
169524.78	176037.55	182647.83	189355.60	196160.87	203063.64
203360.87	211013.94	218775.36	226645.11	234623.19	242709.61

Y_{RIG} (given ϕ = 34 in.)	Y_{RIG} (given ϕ = 35 in.)	Y_{RIG} (given ϕ = 36 in.)	Y_{RIG} (given ϕ = 37 in.)	Y_{RIG} (given ϕ = 38 in.)	Y_{RIG} (given ϕ = 39 in.)
9340.43	9795.74	10261.88	10738.86	11226.67	11725.31
22180.87	23174.82	24190.43	25227.72	26286.67	27367.28
38521.30	40137.23	41785.65	43466.58	45180.00	46925.92
58361.74	60682.97	63047.54	65455.43	67906.67	70401.23
81702.17	84812.05	87976.09	91194.30	94466.67	97793.21
108542.61	112524.45	116571.31	120683.15	124860.00	129101.85
138883.04	143820.20	148833.19	153922.01	159086.67	164327.16
172723.48	178699.28	184761.74	190910.87	197146.67	203469.13
210063.91	217161.69	224356.96	231649.73	239040.00	246527.77
250904.34	259207.42	267618.84	276138.59	284766.66	293503.07

Y_{RIG} (given ϕ = 40 in.)	Y_{RIG} (given ϕ = 41 in.)	Y_{RIG} (given ϕ = 42 in.)	Y_{RIG} (given ϕ = 43 in.)	Y_{RIG} (given ϕ = 44 in.)	Y_{RIG} (given ϕ = 45 in.)
12234.78	12755.09	13286.23	13828.21	14381.01	14944.66
28469.57	29593.51	30739.13	31906.41	33095.36	34305.98
48704.35	50515.27	52358.70	54234.62	56143.04	58083.97
72939.13	75520.36	78144.93	80812.83	83524.06	86278.62
101173.91	104608.79	108097.83	111641.03	115238.40	118889.95
133408.70	137780.54	142217.39	146719.24	151286.08	155917.94
169643.48	175035.63	180503.62	186047.44	191667.10	197362.59
209878.26	216374.06	222956.52	229625.65	236381.44	243223.91
254113.04	261795.82	269576.09	277453.86	285429.13	293501.90
302347.82	310688.40	317028.98	323369.56	329710.14	336050.72

Table 12

TOTAL RIG COSTS FOR HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER*
(in dollars)

$$Y_{RIG} = \left[\frac{DH_i(\phi+8)}{7,200}\right](1,200 + 1.15HPR)$$

Where:

Y_{RIG} = Total rig cost per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3}\phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

HPR = $26(\phi - 10) + \frac{D}{5} - 800$; 500 > HPR > 2,500 is the rig horsepower requirement;

H_i = Factor of the hardness of the soil equal to $\frac{3}{1.3}$ for hard rock.

* In these calculations, this total drilling time is the result of a ratio between total depth and the corresponding penetration rate.

Y_{RIG} (given ϕ = 10 in.)	Y_{RIG} (given ϕ = 11 in.)	Y_{RIG} (given ϕ = 12 in.)	Y_{RIG} (given ϕ = 13 in.)	Y_{RIG} (given ϕ = 14 in.)	Y_{RIG} (given ϕ = 15 in.)
6923.08	7307.69	7692.31	8076.92	8461.54	8846.15
13846.15	14615.39	15384.62	16153.85	16923.08	17692.31
20769.23	21923.08	23076.92	24230.77	25384.62	26538.46
27692.31	29959.10	32302.56	34722.69	37219.49	39792.95
41250.00	44452.08	47750.00	51143.75	54633.33	58218.75
57461.54	61746.35	66146.15	70660.96	75290.77	80035.58
76326.92	81841.89	87491.03	93274.33	99191.80	105243.43
97846.15	104738.72	111784.62	118983.85	126336.41	133842.31
122019.23	130436.83	139026.93	147789.52	156724.62	165832.21
148846.15	158936.22	169217.95	179691.35	190356.41	201213.14

Y_{RIG} (given ϕ = 16 in.)	Y_{RIG} (given ϕ = 17 in.)	Y_{RIG} (given ϕ = 18 in.)	Y_{RIG} (given ϕ = 19 in.)	Y_{RIG} (given ϕ = 20 in.)	Y_{RIG} (given ϕ = 21 in.)
9230.77	9615.38	10000.00	10384.62	10769.23	11153.85
18461.54	19230.77	20000.00	20769.23	21538.46	22307.69
27692.31	28846.15	30230.00	32168.94	34165.38	36219.33
42443.08	45169.87	47973.33	50853.46	53810.26	56843.72
61900.00	65677.08	69550.00	73518.75	77583.33	81743.75
84895.39	89870.19	94960.00	100164.81	105484.62	110919.42
111429.23	117749.20	124203.33	130791.64	137514.10	144370.74
141501.54	149314.10	157280.00	165399.23	173671.80	182097.70
175112.31	184564.91	194190.00	203987.59	213957.69	224100.29
212261.54	223501.60	234933.33	246556.73	258371.79	270378.53

Y_{RIG} (given ϕ = 22 in.)	Y_{RIG} (given ϕ = 23 in.)	Y_{RIG} (given ϕ = 24 in.)	Y_{RIG} (given ϕ = 25 in.)	Y_{RIG} (given ϕ = 26 in.)	Y_{RIG} (given ϕ = 27 in.)
11538.46	11923.08	12307.69	12692.31	13076.92	13461.54
23076.92	23846.15	24615.38	25384.62	26554.87	28006.73
38330.77	40499.71	42726.15	45010.10	47351.54	49750.48
59953.85	63140.64	66404.10	69744.23	73161.03	76654.49
86000.00	90352.09	94800.00	99343.75	103983.33	108718.75
116469.23	122134.04	127913.85	133808.65	139818.46	145943.27
151361.54	158486.51	165745.64	173138.94	180666.41	188328.05
190676.92	199409.49	208295.39	217334.61	226527.18	235873.08
234415.39	244902.98	255563.08	266395.68	277400.77	288578.37
282576.92	294966.99	307548.72	320322.12	333287.18	346443.91

Y_{RIG} (given ϕ = 28 in.)	Y_{RIG} (given ϕ = 29 in.)	Y_{RIG} (given ϕ = 30 in.)	Y_{RIG} (given ϕ = 31 in.)	Y_{RIG} (given ϕ = 32 in.)	Y_{RIG} (given ϕ = 33 in.)
13846.15	14230.77	14615.39	15000.00	15384.62	15769.23
29496.92	31025.45	32592.31	34197.50	35841.03	37522.88
52206.92	54720.87	57292.31	59921.25	62607.69	65351.64
80224.62	83871.41	87594.87	91395.00	95271.80	99225.26
113550.00	118477.08	123500.00	128618.75	133833.33	139143.75
152183.08	158537.88	165007.69	171592.50	178292.31	185107.12
196123.85	204053.82	212117.95	220316.25	228648.72	237115.35
245372.31	255024.87	264830.78	274790.00	284902.57	295168.46
299928.46	311451.06	323146.16	335013.76	347053.85	359266.44
359792.31	373332.37	387064.11	400987.50	415102.57	429409.31

Y_{RIG} (given ϕ = 34 in.)	Y_{RIG} (given ϕ = 35 in.)	Y_{RIG} (given ϕ = 36 in.)	Y_{RIG} (given ϕ = 37 in.)	Y_{RIG} (given ϕ = 38 in.)	Y_{RIG} (given ϕ = 39 in.)
16525.38	17330.93	18155.64	18999.52	19862.56	20744.78
39243.08	41001.60	42798.46	44633.65	46507.18	48419.04
68153.08	71012.02	73928.46	76902.40	79933.85	83022.79
103255.39	107362.18	111545.64	115805.77	120142.57	124556.03
144550.00	150052.08	155650.00	161343.75	167133.33	173018.75
192036.92	199081.73	206241.54	213516.35	220906.15	228410.96
245716.15	254451.12	263320.26	272323.56	281461.02	290732.66
305587.70	316160.26	326886.16	337765.39	348797.95	359983.85
371651.54	384209.14	396939.24	409841.83	422916.93	436164.52
443907.69	458597.75	473479.49	488552.89	503817.94	519274.68

Y_{RIG} (given ϕ = 40 in.)	Y_{RIG} (given ϕ = 41 in.)	Y_{RIG} (given ϕ = 42 in.)	Y_{RIG} (given ϕ = 43 in.)	Y_{RIG} (given ϕ = 44 in.)	Y_{RIG} (given ϕ = 45 in.)
21646.15	22566.70	23506.41	24465.29	25443.33	26440.54
50369.23	52357.76	54384.62	56449.81	58553.33	60695.19
86169.23	89373.17	92634.62	95953.56	99330.00	102763.94
129046.15	133612.95	138256.41	142976.54	147773.33	152646.80
179000.00	185077.09	191250.00	197518.75	203883.33	210343.75
236030.77	243765.58	251615.39	259580.19	267660.00	275854.81
300138.46	309678.43	319352.57	329160.87	339103.33	349179.97
371323.08	382815.65	394461.54	406260.77	418213.33	430319.23
449584.62	463177.22	476942.32	490879.91	504990.00	519272.60
534923.07	549679.49	560897.44	572115.38	583333.33	594551.28

Table 13

TOTAL RIG COSTS FOR VERY HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER*
(in dollars)

$$Y_{RIG} = \left[\frac{DH_i(\phi+8)}{7,200}\right](1,200 + 1.15HPR)$$

Where:

Y_{RIG} = Total rig cost; per well;

ϕ = Diameter of the hole drilled in feet. In our calculations this variable ranges from 10 to 45 inches and the inside diameter (ID) of the casing ranges from 8 to 30 inches, given that casing ID $\approx \frac{2}{3} \phi$;

D = Depth ranging from 1,000 to 10,000 feet in our calculations;

HPR = $26(\phi - 10) + \frac{D}{5} - 800$; $500 > HPR > 2,500$ is the rig horsepower requirement;

H_i = Factor of the hardness of the soil equal to 3 for very hard rock.

* In these calculations, this total drilling time is the result of a ratio between total depth and the corresponding penetration rate.

Y_{RIG} (given ϕ = 10 in.)	Y_{RIG} (given ϕ = 11 in.)	Y_{RIG} (given ϕ = 12 in.)	Y_{RIG} (given ϕ = 13 in.)	Y_{RIG} (given ϕ = 14 in.)	Y_{RIG} (given ϕ = 15 in.)
9000.00	9500.00	10000.00	10500.00	11000.00	11500.00
18000.00	19000.00	20000.00	21000.00	22000.00	23000.00
27000.00	28500.00	30000.00	31500.00	33000.00	34500.00
36000.00	38946.83	41993.33	45139.50	48385.33	51730.83
53625.00	57787.71	62075.00	66486.88	71023.33	75684.37
74700.00	80270.25	85990.00	91859.25	97878.00	104046.25
99225.00	106394.46	113738.33	121256.63	128949.33	136816.46
127200.00	136160.33	145320.00	154679.00	164237.33	173995.00
158625.00	169567.88	180735.00	192126.38	203742.00	215581.88
193500.00	206617.08	219983.34	233598.75	247463.33	261577.08

Y_{RIG} (given ϕ = 16 in.)	Y_{RIG} (given ϕ = 17 in.)	Y_{RIG} (given ϕ = 18 in.)	Y_{RIG} (given ϕ = 19 in.)	Y_{RIG} (given ϕ = 20 in.)	Y_{RIG} (given ϕ = 21 in.)
12000.00	12500.00	13000.00	13500.00	14000.00	14500.00
24000.00	25000.00	26000.00	27000.00	28000.00	29000.00
36000.00	37500.00	39299.00	41819.63	44415.00	47085.12
55176.00	58720.83	62365.33	66109.50	69953.33	73896.83
80470.00	85380.21	90415.00	95574.37	100858.33	106266.88
110364.00	116831.25	123448.00	130214.25	137130.00	144195.25
144858.00	153073.96	161464.33	170029.13	178768.33	187681.96
183952.00	194108.33	204464.00	215019.00	225773.33	236727.00
227646.00	239934.38	252447.00	265183.87	278145.00	291330.38
275940.00	290552.09	305413.33	320523.75	335883.33	351492.09

Y_{RIG} (given ϕ = 22 in.)	Y_{RIG} (given ϕ = 23 in.)	Y_{RIG} (given ϕ = 24 in.)	Y_{RIG} (given ϕ = 25 in.)	Y_{RIG} (given ϕ = 26 in.)	Y_{RIG} (given ϕ = 27 in.)
15000.00	15500.00	16000.00	16500.00	17000.00	17500.00
30000.00	31000.00	32000.00	33000.00	34521.33	36408.75
49830.00	52649.63	55544.00	58513.13	61557.00	64675.62
77940.00	82082.83	86325.33	90667.50	95109.33	99650.83
111800.00	117457.71	123240.00	129146.87	135178.33	141334.37
151410.00	158774.25	166288.00	173951.25	181764.00	189726.25
196770.00	206032.46	215469.33	225080.62	234866.34	244826.46
247880.00	259232.34	270784.00	282535.00	294485.34	306635.00
304740.00	318373.88	332232.00	346314.38	360621.00	375151.88
367350.00	383457.09	399813.34	416418.75	433273.34	450377.08

Y_{RIG} (given ϕ = 28 in.)	Y_{RIG} (given ϕ = 29 in.)	Y_{RIG} (given ϕ = 30 in.)	Y_{RIG} (given ϕ = 31 in.)	Y_{RIG} (given ϕ = 32 in.)	Y_{RIG} (given ϕ = 33 in.)
18000.00	18500.00	19000.00	19500.00	20000.00	20500.00
38346.00	40333.08	42370.00	44456.75	46593.33	48779.75
67869.00	71137.12	74480.00	77897.63	81390.00	84957.13
104292.00	109032.83	113873.33	118813.50	123853.33	128992.83
147615.00	154020.21	160550.00	167204.37	173983.33	180886.38
197838.00	206099.25	214510.00	223070.25	231780.00	240639.25
254961.00	265269.96	275753.34	286411.13	297243.34	308249.96
318984.00	331532.33	344280.01	357227.00	370373.34	383719.00
389907.00	404886.37	420090.01	435517.88	451170.00	467046.37
467730.00	485332.08	503183.34	521283.75	539633.34	558232.09

Y_{RIG} (given ϕ = 34 in.)	Y_{RIG} (given ϕ = 35 in.)	Y_{RIG} (given ϕ = 36 in.)	Y_{RIG} (given ϕ = 37 in.)	Y_{RIG} (given ϕ = 38 in.)	Y_{RIG} (given ϕ = 39 in.)
21483.00	22530.21	23602.33	24699.37	25821.33	26968.21
51016.00	53302.08	55638.00	58023.75	60459.33	62944.75
88599.00	92315.62	96107.00	99973.13	103914.00	107929.63
134232.00	139570.83	145009.33	150547.50	156185.34	161922.83
187915.00	195067.71	202345.00	209746.88	217273.33	224924.37
249648.00	258806.25	268114.00	277571.25	287178.00	296934.25
319431.00	330786.46	342316.34	354020.63	365899.33	377952.46
397264.00	411008.34	424952.00	439095.00	453437.34	467979.00
483147.00	499471.88	516021.01	532794.38	549792.00	567013.87
577080.00	596177.08	615523.34	635118.76	654963.33	675057.08

Y_{RIG} (given ϕ = 40 in.)	Y_{RIG} (given ϕ = 41 in.)	Y_{RIG} (given ϕ = 42 in.)	Y_{RIG} (given ϕ = 43 in.)	Y_{RIG} (given ϕ = 44 in.)	Y_{RIG} (given ϕ = 45 in.)
28140.00	29336.71	30558.33	31804.88	33076.33	34372.71
65480.00	68065.08	70700.00	73384.75	76119.33	78903.75
112020.00	116185.13	120425.00	124739.63	129129.00	133593.13
167760.00	173696.83	179733.33	185869.50	192105.33	198440.83
232700.00	240600.21	248625.01	256774.38	265048.33	273446.87
306840.00	316895.25	327100.00	337454.25	347958.00	358611.26
390180.00	402581.96	415158.34	427909.13	440834.33	453933.96
482720.00	497660.34	512800.00	528139.00	543677.33	559415.00
584460.01	602130.38	620025.01	638143.87	656487.00	675054.38
695399.99	714583.33	729166.67	743749.99	758333.33	772916.67

Table 14

TOTAL FIXED COSTS
(in dollars)

$$Y_{FC} = Y_{MOB} + Y_{SP} + Y_{RT} + Y_{SC}$$

Where:

Y_{MOB} = $400 + 4(HPR - 500)$ is the mobilization and demobilization costs as a function of the rig horsepower requirement $HPR = 26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$;

Y_{SP} = $2,000 + 6.5(HPR - 500)$ is the site preparation cost as a function of the rig horsepower $HPR = 26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$;

Y_{RT} = $3,800 + 4.1(HPR - 500)$ is the rig-up and tear-down cost as a function of the rig horsepower $HPR = 26(\phi - 10) + \frac{D}{5} - 800$; $500 < HPR < 2,500$;

Y_{SC} = 0.025 (total variable cost) is the surface casing cost as a function of total variable costs which include costs for mud, cementing, casing, cutter and rig.

Y_{FC} (given ϕ = 10 in.)	Y_{FC} (given ϕ = 11 in.)	Y_{FC} (given ϕ = 12 in.)	Y_{FC} (given ϕ = 13 in.)	Y_{FC} (given ϕ = 14 in.)	Y_{FC} (given ϕ = 15 in.)
10002.67	10046.27	10090.92	10136.63	10183.39	10231.21
10205.34	10292.53	10381.84	10473.25	10566.78	10662.41
10408.00	10538.80	10672.75	10809.88	10950.17	11093.62
10610.67	11174.95	11744.54	12319.43	12899.62	13485.12
13827.09	14442.75	15065.04	15693.96	16329.51	16971.69
17081.01	17750.13	18427.21	19112.24	19805.23	20506.18
20372.43	21097.09	21831.04	22574.28	23326.79	24088.58
23701.34	24483.64	25276.55	26080.06	26894.18	27718.91
27067.76	27909.77	28763.71	29629.59	30507.40	31397.14
30471.68	31375.48	32292.55	33222.87	34166.46	35123.30

Y_{FC} (given ϕ = 16 in.)	Y_{FC} (given ϕ = 17 in.)	Y_{FC} (given ϕ = 18 in.)	Y_{FC} (given ϕ = 19 in.)	Y_{FC} (given ϕ = 20 in.)	Y_{FC} (given ϕ = 21 in.)
10280.08	10330.01	10380.99	10433.03	10486.13	10540.27
10760.16	10860.02	10961.98	11066.06	11172.25	11280.55
11240.24	11390.03	11663.03	12209.84	12760.63	13315.39
14075.92	14672.03	15273.44	15880.15	16492.17	17109.49
17620.50	18275.94	18938.01	19606.71	20282.04	20964.00
21215.08	21931.94	22656.76	23389.53	24130.25	24878.93
24859.66	25640.02	26429.66	27228.59	28036.79	28854.28
28554.24	29400.19	30256.74	31123.90	32001.67	32890.05
32298.82	33212.44	34137.98	35075.46	36024.88	36986.23
36093.40	37076.77	38073.39	39083.28	40106.42	41142.82

Continued

Y_{FC} (given ϕ = 22 in.)	Y_{FC} (given ϕ = 23 in.)	Y_{FC} (given ϕ = 24 in.)	Y_{FC} (given ϕ = 25 in.)	Y_{FC} (given ϕ = 26 in.)	Y_{FC} (given ϕ = 27 in.)
10595.48	10651.74	10709.05	10767.42	10826.85	10887.33
11390.96	11503.48	11618.[illegible]1	11734.85	12092.96	12603.17
13874.14	14436.86	15003.56	15574.24	16148.89	16727.53
17732.12	18360.05	18993.28	19631.82	20275.66	20924.80
21652.59	22347.81	23049.67	23758.15	24473.26	25195.00
25635.57	26400.17	27172.72	27953.23	28741.69	29538.11
29681.05	30517.10	31362.44	32217.05	33080.95	33954.13
33789.03	34698.62	35618.82	36549.63	37491.05	38443.08
37959.51	38944.73	39941.88	40950.96	41971.98	43004.93
42192.49	43255.41	44331.60	45421.04	46523.75	47639.71

Y_{FC} (given ϕ = 28 in.)	Y_{FC} (given ϕ = 29 in.)	Y_{FC} (given ϕ = 30 in.)	Y_{FC} (given ϕ = 31 in.)	Y_{FC} (given ϕ = 32 in.)	Y_{FC} (given ϕ = 33 in.)
10948.86	11011.45	11075.10	11139.80	11205.56	11272.37
13116.03	13631.54	14149.70	14670.51	15193.98	15720.10
17310.14	17896.73	18487.30	19081.85	19680.37	20282.87
21579.25	22239.01	22904.07	23574.43	24250.09	24931.06
25923.37	26658.37	27400.00	28148.26	28903.15	29664.67
30342.48	31154.81	31975.10	32803.34	33639.54	34483.70
34836.59	35728.34	36629.37	37539.67	38459.26	39388.14
39405.71	40378.95	41362.80	42357.26	43362.32	44377.99
44049.82	45106.64	46175.40	47256.09	48348.71	49453.27
48768.94	49911.42	51067.16	52236.17	53418.43	54613.96

Y_{FC} (given ϕ = 34 in.)	Y_{FC} (given ϕ = 35 in.)	Y_{FC} (given ϕ = 36 in.)	Y_{FC} (given ϕ = 37 in.)	Y_{FC} (given ϕ = 38 in.)	Y_{FC} (given ϕ = 39 in.)
11695.88	12150.35	12606.15	13063.27	13521.72	13981.49
16248.87	16780.29	17314.37	17851.09	18390.47	18932.50
20889.35	21499.81	22114.25	22732.66	23355.06	23981.43
25617.34	26308.92	27005.80	27707.98	28415.47	29128.27
30432.82	31207.60	31989.01	32777.06	33571.73	34373.03
35335.81	36195.87	37063.90	37939.88	38823.81	39715.70
40326.29	41273.73	42230.45	43196.45	44171.73	45156.30
45404.28	46441.17	47488.66	48546.77	49615.48	50694.80
50569.76	51698.19	52838.55	53990.84	55155.07	56331.23
55822.74	57044.79	58280.10	59528.66	60790.49	62065.57

Y_{FC} (given ϕ = 40 in.)	Y_{FC} (given ϕ = 41 in.)	Y_{FC} (given ϕ = 42 in.)	Y_{FC} (given ϕ = 43 in.)	Y_{FC} (given ϕ = 44 in.)	Y_{FC} (given ϕ = 45 in.)
14442.59	14905.02	15368.77	15833.85	16300.25	16767.98
19477.18	20024.52	20574.50	21127.14	21682.43	22240.38
24611.78	25246.10	25884.41	26526.69	27172.95	27823.19
29846.37	30569.77	31298.48	32032.49	32771.80	33516.42
35180.96	35995.52	36816.71	37644.53	38478.98	39320.06
40615.55	41523.35	42439.11	43362.83	44294.50	45234.13
46150.14	47153.27	48165.68	49187.38	50218.35	51258.61
51784.73	52885.27	53996.42	55118.17	56250.53	57393.50
57519.33	58719.36	59931.32	61155.22	62391.05	63638.82
63353.92	64552.61	65419.85	66297.65	67186.00	68084.90

Table 15

TOTAL AND AVERAGE DRILLING COSTS FOR
CASED WELLS IN SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} (given ϕ = 10 in.)	Y_{AVC} (given ϕ = 10 in.)	Y_{TC} (given ϕ = 11 in.)	Y_{AVC} (given ϕ = 11 in.)	Y_{TC} (given ϕ = 12 in.)	Y_{AVC} (given ϕ = 12 in.)
16125.25	16.13	17759.34	17.76	19431.11	19.43
22450.49	11.23	25718.68	12.86	29062.21	14.53
28775.74	9.59	33678.02	11.23	38693.32	12.90
35100.99	8.78	42259.59	10.56	49594.42	12.40
46556.39	9.31	55532.53	11.11	64728.95	12.95
58895.86	9.82	69738.65	11.62	80845.77	13.47
72119.39	10.30	84877.94	12.13	97944.89	13.99
86226.98	10.78	100950.41	12.62	116026.30	14.50
101218.63	11.25	117956.06	13.11	135090.00	15.01
117094.35	11.71	135894.88	13.59	155135.99	15.51

Y_{TC} (given ϕ = 13 in.)	Y_{AVC} (given ϕ = 13 in.)	Y_{TC} (given ϕ = 14 in.)	Y_{AVC} (given ϕ = 14 in.)	Y_{TC} (given ϕ = 15 in.)	Y_{AVC} (given ϕ = 15 in.)
21140.54	21.14	22887.65	22.89	24672.43	24.67
32481.09	16.24	35975.30	17.99	39544.86	19.77
43821.63	14.61	49062.95	16.35	54417.29	18.14
57105.47	14.28	64792.75	16.20	72656.25	18.16
74145.65	14.83	83782.63	16.76	93639.90	18.73
92217.24	15.37	103853.04	17.31	115753.19	19.29
111320.23	15.90	125003.98	17.86	138996.11	19.86
131454.63	16.43	147235.43	18.40	163368.67	20.42
152620.44	16.96	170547.40	18.95	188870.86	20.99
174817.66	17.48	194939.89	19.49	215502.69	21.55

Continued

Y_{TC} (given ϕ = 16 in.)	Y_{AVC} (given ϕ = 16 in.)
26494.88	26.49
43189.77	21.59
59884.65	19.96
80695.98	20.17
103717.45	20.74
127917.67	21.32
153296.64	21.90
179854.36	22.48
207590.83	23.07
236506.05	23.65

Y_{TC} (given ϕ = 17 in.)	Y_{AVC} (given ϕ = 17 in.)
28355.01	28.36
46910.01	23.46
65465.02	21.82
88911.94	22.23
114015.28	22.80
140346.49	23.39
167905.57	23.99
196692.51	24.59
226707.31	25.19
257949.98	25.79

Y_{TC} (given ϕ = 18 in.)	Y_{AVC} (given ϕ = 18 in.)
30252.80	30.25
50705.60	25.35
71351.82	23.78
97304.12	24.33
124533.40	24.91
153039.65	25.51
182822.89	26.12
213883.11	26.74
246220.30	27.36
279834.47	27.98

Y_{TC} (given ϕ = 19 in.)	Y_{AVC} (given ϕ = 19 in.)
32188.27	32.19
54576.53	27.29
77799.35	25.93
105872.53	26.47
135271.79	27.05
165997.15	27.67
198048.61	28.29
231426.15	28.93
266129.80	29.57
302159.53	30.22

Y_{TC} (given ϕ = 20 in.)	Y_{AVC} (given ϕ = 20 in.)
34161.41	34.16
58522.81	29.26
84379.06	28.13
114617.16	28.65
146230.48	29.25
179218.99	29.87
213582.72	30.51
249321.66	31.17
286435.80	31.83
324925.16	32.49

Y_{TC} (given ϕ = 21 in.)	Y_{AVC} (given ϕ = 21 in.)
36172.22	36.17
62544.43	31.27
91090.93	30.36
123538.02	30.88
157409.44	31.48
192705.17	32.12
229425.23	32.78
267569.61	33.45
307138.32	34.13
348131.34	34.81

Continued

Y_{TC} (given ϕ = 22 in.)	Y_{AVC} (given ϕ = 22 in.)
38220.70	38.22
66641.39	33.32
97934.98	32.64
132635.11	33.16
168808.68	33.76
206455.69	34.41
245576.13	35.08
286170.01	35.77
328237.34	36.47
371778.10	37.18

Y_{TC} (given ϕ = 23 in.)	Y_{AVC} (given ϕ = 23 in.)
40306.85	40.31
70813.70	35.41
104911.19	34.97
141908.42	35.48
180428.21	36.09
220470.54	36.75
262035.44	37.43
305122.88	38.14
349732.87	38.86
395865.42	39.59

Y_{TC} (given ϕ = 24 in.)	Y_{AVC} (given ϕ = 24 in.)
42430.67	42.43
75061.35	37.53
112019.57	37.34
151357.96	37.84
192268.01	38.45
234749.74	39.12
278803.13	39.83
324428.19	40.55
371624.91	41.29
420393.30	42.04

Y_{TC} (given ϕ = 25 in.)	Y_{AVC} (given ϕ = 25 in.)
44592.17	44.59
79384.34	39.69
119260.12	39.75
160983.72	40.25
204328.11	40.87
249293.27	41.55
295879.22	42.27
344085.95	43.01
393913.46	43.77
445361.75	44.54

Y_{TC} (given ϕ = 26 in.)	Y_{AVC} (given ϕ = 26 in.)
46791.34	46.79
84149.87	42.07
126632.84	42.21
170785.71	42.70
216608.48	43.32
264101.14	44.02
313263.71	44.75
364096.16	45.51
416598.51	46.29
470770.76	47.08

Y_{TC} (given ϕ = 27 in.)	Y_{AVC} (given ϕ = 27 in.)
49028.18	49.03
89230.55	44.62
134137.73	44.71
180763.93	45.19
229109.14	45.82
279173.36	46.53
330956.59	47.28
384458.83	48.06
439680.08	48.85
496620.34	49.66

Continued

Y_{TC} (given ϕ = 28 in.)	Y_{AVC} (given ϕ = 28 in.)
51302.69	51.30
94399.34	47.20
141774.79	47.26
190918.37	47.73
241830.08	48.37
294509.92	49.08
348957.87	49.85
405173.95	50.65
463158.15	51.46
522910.49	52.29

Y_{TC} (given ϕ = 29 in.)	Y_{AVC} (given ϕ = 29 in.)
53614.87	53.61
99656.24	49.83
149544.02	49.85
201249.04	50.31
254771.30	50.95
310110.80	51.69
367267.53	52.47
426241.51	53.28
487032.73	54.11
549641.19	54.96

Y_{TC} (given ϕ = 30 in.)	Y_{AVC} (given ϕ = 30 in.)
55964.72	55.96
105001.26	52.50
157445.42	52.48
211755.94	52.94
267932.81	53.59
325976.03	54.33
385885.62	55.13
447661.54	55.96
511303.83	56.81
576812.47	57.68

Y_{TC} (given ϕ = 31 in.)	Y_{AVC} (given ϕ = 31 in.)
58352.25	58.35
110434.39	55.22
165478.99	55.16
222439.06	55.61
281314.59	56.26
342105.60	57.02
404812.08	57.83
469434.01	58.68
535971.43	59.55
604424.31	60.44

Y_{TC} (given ϕ = 32 in.)	Y_{AVC} (given ϕ = 32 in.)
60777.45	60.78
115955.63	57.98
173644.73	57.88
233298.40	58.32
294916.66	58.98
358499.50	59.75
424046.93	60.58
491558.94	61.44
561035.53	62.34
632476.71	63.25

Y_{TC} (given ϕ = 33 in.)	Y_{AVC} (given ϕ = 33 in.)
63240.32	63.24
121564.99	60.78
181942.64	60.65
244333.98	61.08
308739.02	61.75
375157.75	62.53
443590.18	63.37
514036.32	64.25
586496.15	65.17
660969.69	66.10

Continued

Y_{TC} (given ϕ = 34 in.)	Y_{AVC} (given ϕ = 34 in.)
66215.03	66.22
127262.46	63.63
190372.71	63.46
255545.78	63.89
322781.66	64.56
392080.34	65.35
463441.84	66.21
536866.16	67.11
612353.27	68.04
689903.23	68.99

Y_{TC} (given ϕ = 35 in.)	Y_{AVC} (given ϕ = 35 in.)
69273.06	69.27
133048.04	66.52
198934.96	66.31
266933.80	66.73
337044.56	67.41
409267.27	68.21
483601.88	69.09
560048.44	70.01
638606.91	70.96
719277.31	71.93

Y_{TC} (given ϕ = 36 in.)	Y_{AVC} (given ϕ = 36 in.)
72375.15	72.38
138921.74	69.46
207629.38	69.21
278498.05	69.62
351527.76	70.31
426718.53	71.12
504070.33	72.01
583583.17	72.95
665257.06	73.92
749091.98	74.91

Y_{TC} (given ϕ = 37 in.)	T_{AVC} (given ϕ = 37 in.)
75521.30	75.52
144883.55	72.44
216455.96	72.15
290238.53	72.56
366231.25	73.25
444434.13	74.07
524847.16	74.98
607470.36	75.93
692303.71	76.92
779347.21	77.93

Y_{TC} (given ϕ = 38 in.)	T_{AVC} (given ϕ = 38 in.)
78711.50	78.71
150933.47	75.47
225414.71	75.14
302155.23	75.54
381155.01	76.23
462414.07	77.07
545932.39	77.99
631709.99	78.96
719746.86	79.97
810043.00	81.00

Y_{TC} (given ϕ = 39 in.)	T_{AVC} (given ϕ = 39 in.)
81945.76	81.95
157071.51	78.54
234505.64	78.17
314248.16	78.56
396299.06	79.26
480658.35	80.11
567326.03	81.05
656302.09	82.04
747586.53	83.07
841179.36	84.12

Continued

Y_{TC} (given ϕ = 40 in.)	Y_{AVC} (given ϕ = 40 in.)
85224.08	85.22
163297.66	81.65
243728.74	81.24
326517.31	81.63
411663.39	82.33
499166.98	83.19
589028.06	84.15
681246.62	85.16
775822.71	86.20
872756.28	87.28

Y_{TC} (given ϕ = 41 in.)	Y_{AVC} (given ϕ = 41 in.)
88546.45	88.55
169611.92	84.81
253084.00	84.36
338962.69	84.74
427248.00	85.45
517939.93	86.32
611038.47	87.29
706543.62	88.32
804455.40	89.38
904325.17	90.43

Y_{TC} (given ϕ = 42 in.)	Y_{AVC} (given ϕ = 42 in.)
91912.88	91.91
176014.29	88.01
262571.43	87.52
351584.30	87.90
443052.90	88.61
536977.23	89.50
633357.29	90.48
732193.08	91.52
833484.59	92.61
934800.05	93.48

Y_{TC} (given ϕ = 43 in.)	Y_{AVC} (given ϕ = 43 in.)
95323.37	95.32
182504.78	91.25
272191.03	90.73
364382.14	91.10
459078.08	91.82
556278.87	92.71
655984.50	93.71
758194.98	94.77
862910.29	95.88
965651.63	96.57

Y_{TC} (given ϕ = 44 in.)	Y_{AVC} (given ϕ = 44 in.)
98777.91	98.78
189083.38	94.54
281942.81	93.98
377356.19	94.34
475323.54	95.06
575844.84	95.97
678920.10	96.99
784549.32	98.07
892732.50	99.19
996879.93	99.69

Y_{TC} (given ϕ = 45 in.)	Y_{AVC} (given ϕ = 45 in.)
102276.51	102.28
195750.09	97.88
291826.75	97.28
390506.47	97.63
491789.28	98.36
595675.16	99.28
702164.10	100.31
811256.12	101.41
922951.22	102.55
1028484.90	102.85

Table 16

TOTAL AND AVERAGE DRILLING COSTS FOR
CASED WELLS IN MEDIUM SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} (given ϕ = 10 in.)	Y_{AVC} (given ϕ = 10 in.)	Y_{TC} (given ϕ = 11 in.)	Y_{AVC} (given ϕ = 11 in.)	Y_{TC} (given ϕ = 12 in.)	Y_{AVC} (given ϕ = 12 in.)
17033.76	17.03	18739.91	18.74	20486.53	20.49
24267.52	12.13	27679.82	13.84	31173.06	15.59
31501.28	10.50	36619.74	12.21	41859.59	13.95
38735.04	9.68	46262.75	11.57	53986.38	13.50
51835.67	10.37	61314.13	12.26	71037.48	14.21
66115.06	11.02	77609.74	12.93	89398.30	14.90
81573.19	11.65	95149.59	13.59	109068.84	15.58
98210.08	12.28	113933.68	14.24	130049.11	16.26
116025.71	12.89	133962.00	14.88	152339.10	16.93
135020.10	13.50	155234.55	15.52	175938.81	17.59

Y_{TC} (given ϕ = 13 in.)	Y_{AVC} (given ϕ = 13 in.)	Y_{TC} (given ϕ = 14 in.)	Y_{AVC} (given ϕ = 14 in.)	Y_{TC} (given ϕ = 15 in.)	Y_{AVC} (given ϕ = 15 in.)
22273.62	22.27	24101.17	24.10	25969.19	25.97
34747.23	17.37	38402.34	19.20	42138.38	21.07
47220.85	15.74	52703.51	17.57	58307.57	19.44
61905.93	15.48	70021.40	17.51	78332.79	19.58
81005.73	16.20	91218.88	18.24	101676.94	20.34
101480.74	16.91	113857.07	18.98	126527.27	21.09
123330.96	17.62	137935.94	19.71	152883.78	21.84
146556.39	18.32	163455.51	20.43	180746.47	22.59
171157.03	19.02	190415.77	21.16	210115.34	23.35
197132.87	19.71	218816.73	21.88	240990.39	24.10

Continued

Y_{TC} (given ϕ = 16 in.)	Y_{AVC} (given ϕ = 16 in.)
27877.67	27.88
45955.35	22.98
64033.02	21.34
86840.10	21.71
112379.89	22.48
139491.35	23.25
168174.47	24.02
198429.26	24.80
230255.72	25.58
263653.85	26.37

Y_{TC} (given ϕ = 17 in.)	Y_{AVC} (given ϕ = 17 in.)
29826.63	29.83
49853.26	24.93
69879.88	23.29
95543.33	23.89
123327.75	24.67
152749.31	25.46
183808.03	26.26
216503.90	27.06
250836.93	27.87
286807.11	28.68

Y_{TC} (given ϕ = 18 in.)	Y_{AVC} (given ϕ = 18 in.)
31816.05	31.82
53832.10	26.92
76067.10	25.36
104442.48	26.11
134520.50	26.90
166301.15	27.72
199784.45	28.54
234970.38	29.37
271858.96	30.21
310450.17	31.05

Y_{TC} (given ϕ = 19 in.)	Y_{AVC} (given ϕ = 19 in.)
33845.93	33.85
57891.87	28.95
82885.08	27.63
113537.55	28.38
145958.15	29.19
180146.88	30.02
216103.73	30.87
253828.70	31.73
293321.80	32.59
334583.03	33.46

Y_{TC} (given ϕ = 20 in.)	Y_{AVC} (given ϕ = 20 in.)
35916.29	35.92
62032.58	31.02
89849.99	29.95
122828.54	30.71
157640.71	31.53
194286.49	32.38
232765.87	33.25
273078.87	34.13
315225.47	35.03
359205.69	35.92

Y_{TC} (given ϕ = 21 in.)	Y_{AVC} (given ϕ = 21 in.)
38027.11	38.03
66254.22	33.13
96961.85	32.32
132315.46	33.08
169568.16	33.91
208719.97	34.79
249770.87	35.68
292720.87	36.59
337569.96	37.51
384318.16	38.43

Continued

Y_{TC} (given ϕ = 22 in.)	Y_{AVC} (given ϕ = 22 in.)
40178.40	40.18
70556.79	35.28
104220.64	34.74
141998.29	35.50
181740.52	36.35
223447.33	37.24
267118.73	38.16
312754.71	39.09
360355.27	40.04
409920.42	40.99

Y_{TC} (given ϕ = 23 in.)	Y_{AVC} (given ϕ = 23 in.)
42370.15	42.37
74940.30	37.47
111626.38	37.21
151877.04	37.97
194157.77	38.83
238468.58	39.74
284809.45	40.69
333180.39	41.65
383581.40	42.62
436012.49	43.60

Y_{TC} (given ϕ = 24 in.)	Y_{AVC} (given ϕ = 24 in.)
44602.37	44.60
79404.75	39.70
119179.05	39.73
161951.71	40.49
206819.93	41.36
253783.70	42.30
302843.03	43.26
353997.91	44.25
407248.35	45.25
462594.35	46.26

Y_{TC} (given ϕ = 25 in.)	Y_{AVC} (given ϕ = 25 in.)
46875.06	46.88
83950.12	41.98
126878.67	42.29
172222.31	43.06
219726.99	43.95
269392.71	44.90
321219.47	45.89
375207.28	46.90
431356.12	47.93
489666.02	48.97

Y_{TC} (given ϕ = 26 in.)	Y_{AVC} (given ϕ = 26 in.)
49188.22	49.19
88988.15	44.49
134725.22	44.91
182688.81	45.67
232878.94	46.58
285295.59	47.55
339938.77	48.56
396808.47	49.60
455904.71	50.66
517227.47	51.72

Y_{TC} (given ϕ = 27 in.)	Y_{AVC} (given ϕ = 27 in.)
51541.84	51.54
94378.20	47.19
142718.72	47.57
193351.25	48.34
246275.80	49.26
301492.36	50.25
359000.93	51.29
418801.53	52.35
480894.13	53.43
545278.74	54.53

Continued

Y_{TC} (given ϕ = 28 in.)	Y_{AVC} (given ϕ = 28 in.)
53935.93	53.94
99866.20	49.93
150859.15	50.29
204209.60	51.05
259917.56	51.98
317983.01	53.00
378405.96	54.06
441186.41	55.15
506324.36	56.26
573819.82	57.38

Y_{TC} (given ϕ = 29 in.)	Y_{AVC} (given ϕ = 29 in.)
56370.48	56.37
105452.16	52.73
159146.53	53.05
215263.88	53.82
273804.21	54.76
334767.53	55.79
398153.84	56.88
463963.12	58.00
532195.41	59.13
602850.67	60.29

Y_{TC} (given ϕ = 30 in.)	Y_{AVC} (given ϕ = 30 in.)
58845.50	58.85
111136.09	55.57
167580.84	55.86
226514.07	56.63
287935.77	57.59
351845.94	58.64
418244.58	59.75
487131.70	60.89
558507.29	62.06
632371.35	63.24

Y_{TC} (given ϕ = 31 in.)	Y_{AVC} (given ϕ = 31 in.)
61360.99	61.36
116917.98	58.46
176162.10	58.72
237960.18	59.49
302312.23	60.46
369218.23	61.54
438678.19	62.67
510692.10	63.84
585259.98	65.03
662381.81	66.24

Y_{TC} (given ϕ = 32 in.)	Y_{AVC} (given ϕ = 32 in.)
63916.95	63.92
122797.82	61.40
184890.29	61.63
249602.22	62.40
316933.58	63.39
386884.39	64.48
459454.65	65.64
534644.35	66.83
612453.48	68.05
692882.08	69.29

Y_{TC} (given ϕ = 33 in.)	Y_{AVC} (given ϕ = 33 in.)
66513.37	66.51
128775.63	64.39
193765.43	64.59
261440.17	65.36
331799.84	66.36
404844.44	67.47
480573.97	68.65
558988.43	69.87
640087.83	71.12
723872.16	72.39

Continued

Y_{TC} (given ϕ = 34 in.)	Y_{AVC} (given ϕ = 34 in.)
69665.69	69.67
134851.39	67.43
202787.51	67.60
273474.05	68.37
346911.00	69.38
423098.37	70.52
502036.16	71.72
583724.36	72.97
668162.98	74.24
755352.02	75.54

Y_{TC} (given ϕ = 35 in.)	Y_{AVC} (given ϕ = 35 in.)
72909.61	72.91
141025.12	70.51
211956.53	70.65
285703.84	71.43
362267.06	72.45
441646.18	73.61
523841.20	74.83
608852.13	76.11
696678.96	77.41
787321.69	78.73

Y_{TC} (given ϕ = 36 in.)	Y_{AVC} (given ϕ = 36 in.)
76202.51	76.20
147296.80	73.65
221272.48	73.76
298129.56	74.53
377868.02	75.57
460487.87	76.75
545989.11	78.00
634371.74	79.30
725635.74	80.63
819781.16	81.98

Y_{TC} (given ϕ = 37 in.)	T_{AVC} (given ϕ = 37 in.)
79544.39	79.54
153666.45	76.83
230735.38	76.91
310751.19	77.69
393713.88	78.74
479623.44	79.94
568479.87	81.21
660283.19	82.54
755033.38	83.89
852730.43	85.27

Y_{TC} (given ϕ = 38 in.)	T_{AVC} (given ϕ = 38 in.)
82935.24	82.94
160134.05	80.07
240345.22	80.12
323568.75	80.89
409804.63	81.96
499052.89	83.18
591313.49	84.47
686586.47	85.82
784871.80	87.21
886169.49	88.62

Y_{TC} (given ϕ = 39 in.)	T_{AVC} (given ϕ = 39 in.)
86375.09	86.38
166699.62	83.35
250102.00	83.37
336582.22	34.15
426140.30	85.23
518776.22	86.46
614489.99	87.78
713281.60	89.16
815151.07	90.57
920098.38	92.01

Continued

Y_{TC} (given ϕ = 40 in.)	Y_{AVC} (given ϕ = 40 in.)
89863.91	89.86
173363.14	86.68
260005.72	86.67
349791.62	87.45
442720.86	88.54
538793.43	89.80
638009.33	91.14
740368.58	92.55
845871.14	93.99
954517.04	95.45

Y_{TC} (given ϕ = 41 in.)	Y_{AVC} (given ϕ = 41 in.)
93401.70	93.40
180124.63	90.06
270056.37	90.02
363196.94	90.80
459546.32	91.91
559104.52	93.18
661871.54	94.55
767847.38	95.98
877032.04	97.45
988856.60	98.89

Y_{TC} (given ϕ = 42 in.)	Y_{AVC} (given ϕ = 42 in.)
96988.48	96.99
186984.07	93.49
280253.97	93.42
376798.17	94.20
476616.68	95.32
579709.49	96.62
686076.61	98.01
795718.04	99.46
908633.76	100.96
1021737.20	102.17

Y_{TC} (given ϕ = 43 in.)	Y_{AVC} (given ϕ = 43 in.)
100624.25	100.62
193941.48	96.97
290598.51	96.87
390595.33	97.65
493931.94	98.79
600608.34	100.10
710624.54	101.52
823980.53	103.00
940676.30	104.52
1055022.40	105.50

Y_{TC} (given ϕ = 44 in.)	Y_{AVC} (given ϕ = 44 in.)
104308.98	104.31
200996.85	100.50
301089.99	100.36
404588.40	101.15
511492.11	102.30
621801.07	103.63
735515.33	105.07
852634.85	106.58
973159.66	108.13
1088712.30	108.87

Y_{TC} (given ϕ = 45 in.)	Y_{AVC} (given ϕ = 45 in.)
108042.70	108.04
208150.17	104.08
311728.41	103.91
418777.40	104.69
529297.16	105.86
643287.69	107.21
760748.98	108.68
881681.01	110.21
1006083.80	111.79
1122806.80	112.28

Table 17

TOTAL AND AVERAGE DRILLING COSTS FOR CASED WELLS IN MEDIUM HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER (in dollars)

Y_{TC} (given ϕ = 10 in.)	Y_{AVC} (given ϕ = 10 in.)
18109.39	18.11
26418.78	13.21
34728.18	11.58
43037.57	10.76
58110.71	11.62
74721.35	12.45
92869.49	13.27
112555.13	14.07
133778.28	14.86
156538.92	15.65

Y_{TC} (given ϕ = 11 in.)	Y_{AVC} (given ϕ = 11 in.)
19896.89	19.90
29993.77	15.00
40090.66	13.36
50989.10	12.75
68168.77	13.63
86971.36	14.50
107396.86	15.34
129445.28	16.18
153116.61	17.01
178410.86	17.84

Y_{TC} (given ϕ = 12 in.)	Y_{AVC} (given ϕ = 12 in.)
21727.64	21.73
33655.29	16.83
45582.93	15.19
59158.11	14.79
78498.67	15.70
99547.56	16.59
122304.79	17.47
146770.35	18.35
172944.24	19.22
200826.47	20.08

Y_{TC} (given ϕ = 13 in.)	Y_{AVC} (given ϕ = 13 in.)
23601.66	23.60
37403.33	18.70
51204.99	17.07
67544.58	16.89
89100.40	17.82
112449.97	18.74
137593.29	19.66
164530.35	20.57
193261.17	21.47
223785.74	22.38

Y_{TC} (given ϕ = 14 in.)	Y_{AVC} (given ϕ = 14 in.)
25518.94	25.52
41237.89	20.62
56956.83	18.99
76148.51	19.04
99973.95	19.99
125678.57	20.95
153262.34	21.89
182725.29	22.84
214067.40	23.79
247288.67	24.73

Y_{TC} (given ϕ = 15 in.)	Y_{AVC} (given ϕ = 15 in.)
27479.49	27.48
45158.98	22.58
62838.46	20.95
84969.91	21.24
111119.34	22.22
139233.36	23.21
169311.96	24.19
201355.15	25.17
235362.92	26.15
271335.27	27.13

Continued

Y_{TC} (given ϕ = 16 in.)	Y_{AVC} (given ϕ = 16 in.)
29483.29	29.48
49166.59	24.58
68849.88	22.95
94008.77	23.50
122536.57	24.51
153114.36	25.52
185742.15	26.53
220419.94	27.55
257147.74	28.57
295925.53	29.59

Y_{TC} (given ϕ = 17 in.)	Y_{AVC} (given ϕ = 17 in.)
31530.36	31.53
53260.72	26.63
74991.08	25.00
103265.10	25.82
134225.62	26.85
167321.55	27.89
202552.90	28.94
239919.67	29.99
279421.86	31.05
321059.45	32.11

Y_{TC} (given ϕ = 18 in.)	Y_{AVC} (given ϕ = 18 in.)
33620.69	33.62
57441.38	28.72
81512.12	27.17
112738.89	28.18
146186.50	29.24
181854.94	30.31
219744.22	31.39
259854.32	32.48
302185.27	33.58
346737.03	34.67

Y_{TC} (given ϕ = 19 in.)	Y_{AVC} (given ϕ = 19 in.)
35754.28	35.75
61708.56	30.85
88747.34	29.58
122430.15	30.61
158419.22	31.68
196714.53	32.79
237316.09	33.90
280223.91	35.03
325437.97	36.16
372958.28	37.30

Y_{TC} (given ϕ = 20 in.)	Y_{AVC} (given ϕ = 20 in.)
37931.14	37.93
66062.27	33.03
96145.66	32.05
132338.88	33.08
170923.76	34.18
211900.32	35.32
255268.54	36.47
301028.42	37.63
349179.98	38.80
399723.19	39.97

Y_{TC} (given ϕ = 21 in.)	Y_{AVC} (given ϕ = 21 in.)
40151.25	40.15
70502.51	35.25
103707.07	34.57
142465.07	35.62
183700.14	36.74
227412.30	37.90
273601.54	39.09
322267.87	40.28
373411.27	41.49
427031.77	42.70

Continued

Y_{TC} (given ϕ = 22 in.)	Y_{AVC} (given ϕ = 22 in.)
42414.63	42.41
75029.26	37.51
111431.59	37.14
152808.72	38.20
196748.35	39.35
243250.48	40.54
292315.11	41.76
343942.24	42.99
398131.88	44.24
454884.00	45.49

Y_{TC} (given ϕ = 23 in.)	Y_{AVC} (given ϕ = 23 in.)
44721.27	44.72
79642.54	39.82
119319.21	39.77
163369.84	40.84
210068.39	42.01
259414.86	43.24
311409.25	44.49
366051.55	45.76
423341.77	47.04
483279.90	48.33

Y_{TC} (given ϕ = 24 in.)	Y_{AVC} (given ϕ = 24 in.)
47071.17	47.07
84342.35	42.17
127369.92	42.46
174148.43	43.54
223660.27	44.73
275905.44	45.98
330883.94	47.27
388595.78	48.57
449040.96	49.89
512219.46	51.22

Y_{TC} (given ϕ = 25 in.)	Y_{AVC} (given ϕ = 25 in.)
49464.34	49.46
89128.67	44.56
135583.73	45.19
185144.48	46.29
237523.97	47.50
292722.22	48.79
350739.21	50.11
411574.95	51.45
475229.44	52.80
541702.69	54.17

Y_{TC} (given ϕ = 26 in.)	Y_{AVC} (given ϕ = 26 in.)
51900.76	51.90
94467.46	47.23
143960.64	47.99
196357.99	49.09
251659.50	50.33
309865.18	51.64
370975.03	53.00
434989.04	54.37
501907.22	55.77
571729.58	57.17

Y_{TC} (given ϕ = 27 in.)	Y_{AVC} (given ϕ = 27 in.)
54380.45	54.38
100201.92	50.10
152500.65	50.83
207788.97	51.95
266066.87	53.21
327334.35	54.56
391591.42	55.94
458838.07	57.35
529074.31	58.79
602300.13	60.23

Continued

Y_{TC} (given ϕ = 28 in.)	Y_{AVC} (given ϕ = 28 in.)
56903.40	56.90
106045.11	53.02
161203.76	53.73
219437.42	54.86
280746.07	56.15
345129.72	57.52
412588.38	58.94
483122.03	60.39
556730.69	61.86
633414.34	63.34

Y_{TC} (given ϕ = 29 in.)	Y_{AVC} (given ϕ = 29 in.)
59469.62	59.47
111997.03	56.00
170069.97	56.69
231303.32	57.83
295697.09	59.14
363251.28	60.54
433965.89	62.00
507840.91	63.48
584876.35	64.99
665072.20	66.51

Y_{TC} (given ϕ = 30 in.)	Y_{AVC} (given ϕ = 30 in.)
62079.09	62.08
118057.68	59.03
179099.28	59.70
243386.70	60.85
310919.96	62.18
381699.05	63.62
455723.97	65.10
532994.74	66.62
613511.33	68.17
697273.75	69.73

Y_{TC} (given ϕ = 31 in.)	Y_{AVC} (given ϕ = 31 in.)
64731.83	64.73
124227.07	62.11
188291.68	62.76
255687.54	63.92
326414.65	65.28
400473.02	66.75
477862.62	68.27
558583.47	69.82
642635.59	71.40
730018.95	73.00

Y_{TC} (given ϕ = 32 in.)	Y_{AVC} (given ϕ = 32 in.)
67427.83	67.43
130505.19	65.25
197647.18	65.88
268205.84	67.05
342181.17	68.44
419573.16	69.93
500381.83	71.48
584607.15	73.08
672249.15	74.69
763307.82	76.33

Y_{TC} (given ϕ = 33 in.)	Y_{AVC} (given ϕ = 33 in.)
70167.09	70.17
136892.04	68.45
207165.79	69.06
280941.62	70.24
358219.53	71.64
438999.52	73.17
523281.60	74.75
611065.76	76.38
702352.01	78.04
797140.35	79.71

Continued

Y_{TC} (given ϕ = 34 in.)	Y_{AVC} (given ϕ = 34 in.)
73515.26	73.52
143387.63	71.69
216847.49	72.28
293894.85	73.47
374529.72	74.91
458752.08	76.46
546561.94	78.08
637959.30	79.74
732944.17	81.44
831516.52	83.15

Y_{TC} (given ϕ = 35 in.)	Y_{AVC} (given ϕ = 35 in.)
76964.51	76.96
149991.94	75.00
226692.29	75.56
307065.55	76.77
391111.73	78.22
478830.83	79.81
570222.84	81.46
665287.77	83.16
764025.62	84.89
866436.37	86.64

Y_{TC} (given ϕ = 36 in.)	Y_{AVC} (given ϕ = 36 in.)
80468.13	80.47
156704.99	78.35
236700.19	78.90
320453.72	80.11
407965.58	81.59
499235.78	83.21
594264.30	84.89
693051.17	86.63
795596.37	88.40
901899.90	90.19

Y_{TC} (given ϕ = 37 in.)	T_{AVC} (given ϕ = 37 in.)
84026.11	84.03
163526.78	81.76
246871.19	82.29
334059.35	83.51
425091.26	85.02
519966.92	86.66
618686.33	88.38
721249.50	90.16
827656.42	91.96
937907.08	93.79

Y_{TC} (given ϕ = 38 in.)	T_{AVC} (given ϕ = 38 in.)
87638.46	87.64
170457.29	85.23
257205.28	85.74
347882.44	86.97
442488.77	88.50
541024.26	90.17
643488.93	91.93
749882.76	93.74
860205.75	95.58
974457.90	97.45

Y_{TC} (given ϕ = 39 in.)	T_{AVC} (given ϕ = 39 in.)
91305.18	91.31
177496.54	88.75
267702.48	89.23
361923.01	90.48
460158.11	92.03
562407.81	93.73
668672.09	95.52
778950.95	97.37
893244.38	99.25
1011552.40	101.16

Continued

Y_{TC} (given ϕ = 40 in.)	Y_{AVC} (given ϕ = 40 in.)
95026.26	95.03
184644.51	92.32
278362.77	92.79
376181.03	94.05
478099.29	95.62
584117.55	97.35
694235.80	99.18
808454.07	101.06
926772.33	102.97
1049190.60	104.92

Y_{TC} (given ϕ = 41. in.)	Y_{AVC} (given ϕ = 41 in.)
98801.71	98.80
191901.23	95.95
289186.17	96.40
390656.52	97.66
496312.30	99.26
606153.49	101.03
720180.09	102.88
838392.12	104.80
960789.55	106.75
1086657.00	108.67

Y_{TC} (given ϕ = 42 in.)	Y_{AVC} (given ϕ = 42 in.)
102631.52	102.63
199266.67	99.63
300172.66	100.06
405349.48	101.34
514797.14	102.96
628515.62	104.75
746504.94	106.64
868765.09	108.60
995296.09	110.59
1122214.00	112.22

Y_{TC} (given ϕ = 43 in.)	Y_{AVC} (given ϕ = 43 in.)
106515.70	106.52
206740.85	103.37
311322.25	103.77
420259.90	105.06
533553.81	106.71
651203.95	108.53
773210.36	110.46
899573.00	112.45
1030291.90	114.48
1158203.70	115.82

Y_{TC} (given ϕ = 44 in.)	Y_{AVC} (given ϕ = 44 in.)
110454.25	110.45
214323.76	107.16
322634.94	107.54
435387.79	108.85
552582.31	110.52
674218.47	112.37
800296.33	114.33
930815.84	116.35
1065777.00	118.42
1194626.00	119.46

Y_{TC} (given ϕ = 45 in.)	Y_{AVC} (given ϕ = 45 in.)
114447.16	114.45
222015.40	111.01
334110.73	111.37
450733.14	112.68
571882.63	114.38
697559.21	116.26
827762.87	118.25
962493.61	120.31
1101751.50	122.42
1231480.90	123.15

Table 18

TOTAL AND AVERAGE DRILLING COSTS FOR
CASED WELLS IN HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} (given ϕ = 10 in.)	Y_{AVC} (given ϕ = 10 in.)
21474.20	21.47
33148.40	16.57
44822.60	14.94
56496.81	14.12
77891.49	15.58
102006.36	17.00
128841.43	18.41
158396.69	19.80
190672.14	21.19
225667.78	22.57

Y_{TC} (given ϕ = 11 in.)	Y_{AVC} (given ϕ = 11 in.)
23491.80	23.49
37183.60	18.59
50875.40	16.96
65693.35	16.42
89670.07	17.93
116518.10	19.42
146237.46	20.89
178828.12	22.35
214290.10	23.81
252623.39	25.26

Y_{TC} (given ϕ = 12 in.)	Y_{AVC} (given ϕ = 12 in.)
25558.25	25.56
41316.51	20.66
57074.76	19.02
75163.88	18.79
101791.14	20.36
131440.84	21.91
164112.97	23.44
199807.54	24.98
238524.54	26.50
280263.98	28.03

Y_{TC} (given ϕ = 13 in.)	Y_{AVC} (given ϕ = 13 in.)
27673.56	27.67
45547.12	22.77
63420.68	21.14
84908.41	21.23
114254.71	22.85
146774.56	24.46
182467.97	26.07
221334.94	27.67
263375.47	29.26
308589.55	30.86

Y_{TC} (given ϕ = 14 in.)	Y_{AVC} (given ϕ = 14 in.)
29837.72	29.84
49875.43	24.94
69913.15	23.30
94926.93	23.73
127060.76	25.41
162519.28	27.09
201302.47	28.76
243410.34	30.43
288842.89	32.09
337600.12	33.76

Y_{TC} (given ϕ = 15 in.)	Y_{AVC} (given ϕ = 15 in.)
32050.73	32.05
54301.45	27.15
76552.18	25.52
105219.45	26.30
140209.31	28.04
178674.98	29.78
220616.45	31.52
266033.72	33.25
314926.79	34.99
367295.67	36.73

Continued

Y_{TC} (given ϕ = 16 in.)	Y_{AVC} (given ϕ = 16 in.)
34312.59	34.31
58825.18	29.41
83337.77	27.78
115785.96	28.95
153700.36	30.74
195241.68	32.54
240409.92	34.34
289205.09	36.15
341627.18	37.96
397676.20	39.77

Y_{TC} (given ϕ = 17 in.)	Y_{AVC} (given ϕ = 17 in.)
36623.31	36.62
63446.61	31.72
90269.92	30.09
126626.46	31.66
167533.89	33.51
212219.36	35.37
260682.88	37.24
312924.45	39.12
368944.06	40.99
428741.71	42.87

Y_{TC} (given ϕ = 18 in.)	Y_{AVC} (given ϕ = 18 in.)
38982.87	38.98
68165.75	34.08
97701.17	32.57
137740.96	34.44
181709.92	36.34
229608.04	38.27
281435.33	40.21
337191.79	42.15
396877.41	44.10
460492.20	46.05

Y_{TC} (given ϕ = 19 in.)	Y_{AVC} (given ϕ = 19 in.)
41391.29	41.39
72982.59	36.49
106110.76	35.37
149129.45	37.28
196228.44	39.25
247407.71	41.23
302667.27	43.24
362007.12	45.25
425427.26	47.27
492927.68	49.29

Y_{TC} (given ϕ = 20 in.)	Y_{AVC} (given ϕ = 20 in.)
43848.57	43.85
77897.14	38.95
114725.84	38.24
160791.94	40.20
211089.45	42.22
265618.37	44.27
324378.70	46.34
387370.44	48.42
454593.59	50.51
526048.16	52.60

Y_{TC} (given ϕ = 21 in.)	Y_{AVC} (given ϕ = 21 in.)
46354.69	46.35
82909.39	41.45
123546.41	41.18
172728.42	43.18
226292.95	45.26
284240.02	47.37
346569.62	49.51
413281.75	51.66
484376.42	53.82
559853.61	55.99

Continued

Y_{TC} (given ϕ = 22 in.)	Y_{AVC} (given ϕ = 22 in.)
48909.67	48.91
88019.34	44.01
132572.49	44.19
184938.89	46.23
241838.95	48.37
303272.66	50.55
369240.02	52.75
439741.04	54.97
514775.72	57.20
594344.04	59.43

Y_{TC} (given ϕ = 23 in.)	Y_{AVC} (given ϕ = 23 in.)
51513.50	51.51
93227.01	46.61
141804.05	47.27
197423.36	49.36
257727.44	51.55
322716.29	53.79
392389.92	56.06
466748.33	58.34
545791.51	60.64
629519.48	62.95

Y_{TC} (given ϕ = 24 in.)	Y_{AVC} (given ϕ = 24 in.)
54166.19	54.17
98532.38	49.27
151241.12	50.41
210181.82	52.55
273958.42	54.79
342570.91	57.10
416019.30	59.43
494303.59	61.79
577423.78	64.16
665379.88	66.54

Y_{TC} (given ϕ = 25 in.)	Y_{AVC} (given ϕ = 25 in.)
56867.72	56.87
103935.45	51.97
160883.61	53.63
223214.27	55.80
290531.89	58.11
362836.52	60.47
440128.18	62.88
522406.86	65.30
609672.56	67.74
701925.26	70.19

Y_{TC} (given ϕ = 26 in.)	Y_{AVC} (given ϕ = 26 in.)
59618.11	59.62
110080.88	55.04
170731.73	56.91
236520.72	59.13
307447.85	61.49
383513.12	63.92
464716.54	66.39
551058.10	68.88
642537.79	71.39
739155.64	73.92

Y_{TC} (given ϕ = 27 in.)	Y_{AVC} (given ϕ = 27 in.)
62417.36	62.42
116758.66	58.38
180785.27	60.26
250101.16	62.53
324706.31	64.94
404600.72	67.43
489784.40	69.97
580257.33	72.53
676019.53	75.11
777071.00	77.71

Continued

Y_{TC} (given ϕ = 28 in.)	Y_{AVC} (given ϕ = 28 in.)
65265.45	65.27
123573.43	61.79
191044.32	63.68
263955.60	65.99
342307.26	68.46
426099.30	71.02
515331.74	73.62
610004.55	76.25
710117.75	78.90
815671.34	81.57

Y_{TC} (given ϕ = 29 in.)	Y_{AVC} (given ϕ = 29 in.)
68162.40	68.16
130525.20	65.26
201508.86	67.17
278084.02	69.52
360250.70	72.05
448008.88	74.67
541358.56	77.34
640299.76	80.04
744832.46	82.76
854956.65	85.50

Y_{TC} (given ϕ = 30 in.)	Y_{AVC} (given ϕ = 30 in.)
71108.20	71.11
137613.97	68.81
212178.90	70.73
292486.45	73.12
378536.64	75.71
470329.45	78.39
567864.88	81.12
671142.96	83.89
780163.65	86.68
894926.98	89.49

Y_{TC} (given ϕ = 31 in.)	Y_{AVC} (given ϕ = 31 in.)
74102.85	74.10
144839.73	72.42
223054.43	74.35
307162.87	76.79
397165.06	79.43
493061.01	82.18
594850.69	84.98
702534.14	87.82
816111.34	90.68
935582.26	93.56

Y_{TC} (given ϕ = 32 in.)	Y_{AVC} (given ϕ = 32 in.)
77146.35	77.15
152202.50	76.10
234135.45	78.05
322113.28	80.53
416135.98	83.23
516203.55	86.03
622315.99	88.90
734473.32	91.81
852675.49	94.74
976922.55	97.69

Y_{TC} (given ϕ = 33 in.)	Y_{AVC} (given ϕ = 33 in.)
80238.71	80.24
159702.25	79.85
245421.97	81.81
337337.68	84.33
435449.39	87.09
539757.09	89.96
650260.78	92.89
766960.47	95.87
889856.14	98.87
1018947.80	101.89

Continued

Y_{TC} (given ϕ = 34 in.)	Y_{AVC} (given ϕ = 34 in.)
84111.15	84.11
167339.01	83.67
256913.99	85.64
352836.09	88.21
455105.29	91.02
563721.62	93.95
678685.05	96.96
799995.62	100.00
927653.28	103.07
1061658.10	106.17

Y_{TC} (given ϕ = 35 in.)	Y_{AVC} (given ϕ = 35 in.)
88112.26	88.11
175112.76	87.56
268611.50	89.54
368608.48	92.15
475103.68	95.02
588097.13	98.02
707588.82	101.08
833578.74	104.20
966066.91	107.34
1105053.30	110.51

Y_{TC} (given ϕ = 36 in.)	Y_{AVC} (given ϕ = 36 in.)
92181.88	92.18
183023.51	91.51
280514.51	93.50
384654.86	96.16
495444.57	99.09
612883.65	102.15
736972.07	105.28
867709.87	108.46
1005097.00	111.68
1149133.50	114.91

Y_{TC} (given ϕ = 37 in.)	T_{AVC} (given ϕ = 37 in.)
96319.99	96.32
191071.26	95.54
292623.01	97.54
400975.24	100.24
516127.96	103.23
638081.15	106.35
766834.83	109.55
902388.97	112.80
1044743.60	116.08
1193898.70	119.39

Y_{TC} (given ϕ = 38 in.)	T_{AVC} (given ϕ = 38 in.)
100526.60	100.53
199256.00	99.63
304937.01	101.65
417569.61	104.39
537153.82	107.43
663689.64	110.61
797177.05	113.88
937616.07	117.20
1085006.70	120.56
1239348.90	123.93

Y_{TC} (given ϕ = 39 in.)	T_{AVC} (given ϕ = 39 in.)
104801.71	104.80
207577.74	103.79
317456.50	105.82
434437.98	108.61
558522.19	111.70
689709.12	114.95
827998.78	118.29
973391.16	121.67
1125886.20	125.10
1285484.10	128.55

Continued

Y_{TC} (given ϕ = 40 in.)	Y_{AVC} (given ϕ = 40 in.)
109145.32	109.15
216036.48	108.02
330181.49	110.06
451580.34	112.90
580233.04	116.05
716139.59	119.36
859299.98	122.76
1009714.20	126.21
1167382.30	129.71
1332304.20	133.23

Y_{TC} (given ϕ = 41 in.)	Y_{AVC} (given ϕ = 41 in.)
113557.42	113.56
224632.21	112.32
343111.97	114.37
468996.69	117.25
602286.39	120.46
742981.06	123.83
891080.69	127.30
1046585.30	130.82
1209494.90	134.39
1378611.00	137.86

Y_{TC} (given ϕ = 42 in.)	Y_{AVC} (given ϕ = 42 in.)
118038.03	118.04
233364.94	116.68
356247.95	118.75
486687.05	121.67
624682.23	124.94
770233.50	128.37
923340.87	131.91
1084004.30	135.50
1252223.90	139.14
1421487.40	142.15

Y_{TC} (given ϕ = 43 in.)	Y_{AVC} (given ϕ = 43 in.)
122587.13	122.59
242234.67	121.12
369589.43	123.20
504651.39	126.16
647420.57	129.48
797896.95	132.98
956080.55	136.58
1121971.40	140.25
1295569.40	143.95
1464852.40	146.49

Y_{TC} (given ϕ = 44 in.)	Y_{AVC} (given ϕ = 44 in.)
127204.73	127.20
251241.39	125.62
383136.39	127.71
522889.72	130.72
670501.40	134.10
825971.38	137.66
989299.72	141.33
1160486.40	145.06
1339531.40	148.84
1508705.80	150.87

Y_{TC} (given ϕ = 45 in.)	Y_{AVC} (given ϕ = 45 in.)
131890.83	131.89
260385.11	130.19
396888.87	132.30
541402.05	135.35
693924.71	138.78
854456.82	142.41
1022998.40	146.14
1199549.40	149.94
1384109.90	153.79
1553047.80	155.30

Table 19

TOTAL AND AVERAGE DRILLING COSTS FOR
CASED WELLS IN VERY HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} (given ϕ = 10 in.)	Y_{AVC} (given ϕ = 10 in.)	Y_{TC} (given ϕ = 11 in.)	Y_{AVC} (given ϕ = 11 in.)	Y_{TC} (given ϕ = 12 in.)	Y_{AVC} (given ϕ = 12 in.)
23882.57	23.88	26077.14	26.08	28326.15	28.33
37965.15	18.98	42354.28	21.18	46852.31	23.43
52047.72	17.35	58631.43	19.54	65378.46	21.79
66130.29	16.53	76258.67	19.06	86706.98	21.68
91973.49	18.39	105030.21	21.01	118486.85	23.70
121352.94	20.23	137534.46	22.92	154195.87	25.70
154268.63	22.04	173771.42	24.82	193834.08	27.69
190720.58	23.84	213741.08	26.72	237401.44	29.68
230708.78	25.63	257443.45	28.60	284897.97	31.66
274233.23	27.42	304878.53	30.49	336323.66	33.63

Y_{TC} (given ϕ = 13 in.)	Y_{AVC} (given ϕ = 13 in.)	Y_{TC} (given ϕ = 14 in.)	Y_{AVC} (given ϕ = 14 in.)	Y_{TC} (given ϕ = 15 in.)	Y_{AVC} (given ϕ = 15 in.)
30629.61	30.63	32987.51	32.99	35399.85	35.40
51459.22	25.73	56175.02	28.09	60999.70	30.50
72288.83	24.10	79362.53	26.45	86599.55	28.87
97475.23	24.37	108563.40	27.14	119971.51	29.99
132343.40	26.47	146599.86	29.32	161256.24	32.25
171337.19	28.56	188958.40	31.49	207059.51	34.51
214456.61	30.64	235639.03	33.66	257381.32	36.77
261701.66	32.71	286641.74	35.83	312221.68	39.03
313072.33	34.79	341966.53	38.00	371580.58	41.29
368568.62	36.86	401613.41	40.16	435458.02	43.55

Continued

Y_{TC} (given ϕ = 16 in.)	Y_{AVC} (given ϕ = 16 in.)
37866.64	37.87
65933.27	32.97
93999.91	31.33
131699.54	32.92
176312.53	35.26
225640.51	37.61
279683.50	39.95
338441.48	42.31
401914.47	44.66
470102.46	47.01

Y_{TC} (given ϕ = 17 in.)	Y_{AVC} (given ϕ = 17 in.)
40387.86	40.39
70975.73	35.49
101563.59	33.85
143747.51	35.94
191768.74	38.35
244701.42	40.78
302545.56	43.22
365301.16	45.66
432968.22	48.11
505546.73	50.55

Y_{TC} (given ϕ = 18 in.)	Y_{AVC} (given ϕ = 18 in.)
42963.54	42.96
76127.07	38.06
109713.88	36.57
156115.41	39.03
207624.85	41.52
264242.21	44.04
325967.49	46.57
392800.68	49.10
464741.79	51.64
541790.82	54.18

Y_{TC} (given ϕ = 19 in.)	Y_{AVC} (given ϕ = 19 in.)
45593.65	45.59
81387.30	40.69
119029.97	39.68
168803.23	42.20
223880.88	44.78
284262.90	47.38
349949.30	49.99
420940.07	52.62
497235.21	55.25
578834.73	57.88

Y_{TC} (given ϕ = 20 in.)	Y_{AVC} (given ϕ = 20 in.)
48278.21	48.28
86756.41	43.38
128586.00	42.86
181811.00	45.45
240536.82	48.11
304763.49	50.79
374491.00	53.50
449719.33	56.21
530448.49	58.94
616678.49	61.67

Y_{TC} (given ϕ = 21 in.)	Y_{AVC} (given ϕ = 21 in.)
51017.21	51.02
92234.42	46.12
138381.97	46.13
195138.69	48.78
257592.69	51.52
325743.98	54.29
399592.56	57.08
479138.44	59.89
564381.61	62.71
655322.07	65.53

Continued

Y_{TC} (given ϕ = 22 in.)	Y_{AVC} (given ϕ = 22 in.)
53810.65	53.81
97821.30	48.91
148417.90	49.47
208786.30	52.20
275048.46	55.01
347204.36	57.87
425254.01	60.75
509197.41	63.65
599034.57	66.56
694765.47	69.48

Y_{TC} (given ϕ = 23 in.)	Y_{AVC} (given ϕ = 23 in.)
56658.54	56.66
103517.08	51.76
158693.78	52.90
222753.86	55.69
292904.15	58.58
369144.64	61.52
451475.34	64.50
539896.25	67.49
634407.38	70.49
735008.71	73.50

Y_{TC} (given ϕ = 24 in.)	Y_{AVC} (given ϕ = 24 in.)
59560.87	59.56
109321.74	54.66
169209.60	56.40
237041.34	59.26
311159.75	62.23
391564.81	65.26
478256.54	68.32
571234.95	71.40
670500.01	74.50
776051.75	77.61

Y_{TC} (given ϕ = 25 in.)	Y_{AVC} (given ϕ = 25 in.)
62517.64	62.52
115235.28	57.62
179965.38	59.99
251648.75	62.91
329815.26	65.96
414464.88	69.08
505597.63	72.23
603213.51	75.40
707312.51	78.59
817894.64	81.79

Y_{TC} (given ϕ = 26 in.)	Y_{AVC} (given ϕ = 26 in.)
65528.86	65.53
122025.68	61.01
190961.10	63.65
266576.09	66.64
348870.68	69.77
437844.84	72.97
533498.59	76.21
635831.92	79.48
744844.85	82.76
860537.34	86.05

Y_{TC} (given ϕ = 27 in.)	Y_{AVC} (given ϕ = 27 in.)
68594.52	68.59
129446.20	64.72
202196.76	67.40
281823.37	70.46
368326.02	73.67
461704.71	76.95
561959.44	80.28
669090.21	83.64
783097.03	87.01
903979.87	90.40

Continued

Y_{TC} (given ϕ = 28 in.)	Y_{AVC} (given ϕ = 28 in.)
71714.62	71.71
137026.69	68.51
213672.38	71.22
297390.58	74.35
388181.28	77.64
486044.46	81.01
590980.16	84.43
702988.36	87.87
822069.06	91.34
948222.25	94.82

Y_{TC} (given ϕ = 29 in.)	Y_{AVC} (given ϕ = 29 in.)
74889.16	74.89
144767.14	72.38
225387.95	75.13
313277.71	78.32
408436.43	81.69
510864.12	85.14
620560.75	88.65
737526.35	92.19
861760.91	95.75
993264.42	99.33

Y_{TC} (given ϕ = 30 in.)	Y_{AVC} (given ϕ = 30 in.)
78118.15	78.12
152667.56	76.33
237343.46	79.11
329484.78	82.37
429091.52	85.82
536163.67	89.36
650701.24	92.96
772704.24	96.59
902172.64	100.24
1039106.50	103.91

Y_{TC} (given ϕ = 31 in.)	Y_{AVC} (given ϕ = 31 in.)
81401.58	81.40
160727.94	80.36
249538.92	83.18
346011.78	86.50
450146.51	90.03
561943.13	93.66
681401.60	97.34
808521.96	101.07
943304.19	104.81
1085748.30	108.57

Y_{TC} (given ϕ = 32 in.)	Y_{AVC} (given ϕ = 32 in.)
84739.46	84.74
168948.29	84.47
261974.33	87.32
362858.70	90.71
471601.42	94.32
588202.46	98.03
712661.83	101.81
844979.55	105.62
985155.59	109.46
1133190.00	113.32

Y_{TC} (given ϕ = 33 in.)	Y_{AVC} (given ϕ = 33 in.)
88131.78	88.13
177328.60	88.66
274649.69	91.55
380025.57	95.01
493456.24	98.69
614941.70	102.49
744481.94	106.35
882077.00	110.26
1027726.80	114.19
1181431.50	118.14

Continued

Y_{TC} (given ϕ = 34 in.)	Y_{AVC} (given ϕ = 34 in.)
92424.01	92.42
185868.88	92.93
287565.00	95.85
397512.36	99.38
515710.97	103.14
642160.84	107.03
776861.95	110.98
919814.32	114.98
1071017.90	119.00
1230472.80	123.05

Y_{TC} (given ϕ = 35 in.)	Y_{AVC} (given ϕ = 35 in.)
96865.71	96.87
194569.12	97.28
300720.24	100.24
415319.08	103.83
538365.61	107.67
669859.86	111.64
809801.82	115.69
958191.49	119.77
1115028.90	123.89
1280313.90	128.03

Y_{TC} (given ϕ = 36 in.)	Y_{AVC} (given ϕ = 36 in.)
101387.38	101.39
203429.33	101.71
314115.45	104.71
433445.73	108.36
561420.18	112.28
698038.80	116.34
843301.58	120.47
997208.52	124.65
1159759.70	128.86
1330954.90	133.10

Y_{TC} (given ϕ = 37 in.)	T_{AVC} (given ϕ = 37 in.)
105989.04	105.99
212449.51	106.22
327750.60	109.25
451892.31	112.97
584874.66	116.97
726697.62	121.12
877361.22	125.34
1036865.40	129.61
1205210.30	133.91
1382395.70	138.24

Y_{TC} (given ϕ = 38 in.)	T_{AVC} (given ϕ = 38 in.)
110670.68	110.67
221629.64	110.81
341625.69	113.88
470658.83	117.66
608729.03	121.75
755836.33	125.97
911980.72	130.28
1077162.20	134.65
1251380.70	139.04
1434636.30	143.46

Y_{TC} (given ϕ = 39 in.)	T_{AVC} (given ϕ = 39 in.)
115432.30	115.43
230969.75	115.48
355740.74	118.58
489745.27	122.44
632983.34	126.60
785454.95	130.91
947160.12	135.31
1118098.80	139.76
1298271.00	144.25
1487676.80	148.77

Continued

Y_{TC} (given ϕ = 40 in.)	Y_{AVC} (given ϕ = 40 in.)
120273.91	120.27
240469.82	120.23
370095.73	123.37
509151.64	127.29
657637.55	131.53
815553.47	135.93
982899.39	140.41
1159675.30	144.96
1345881.20	149.54
1541517.10	154.15

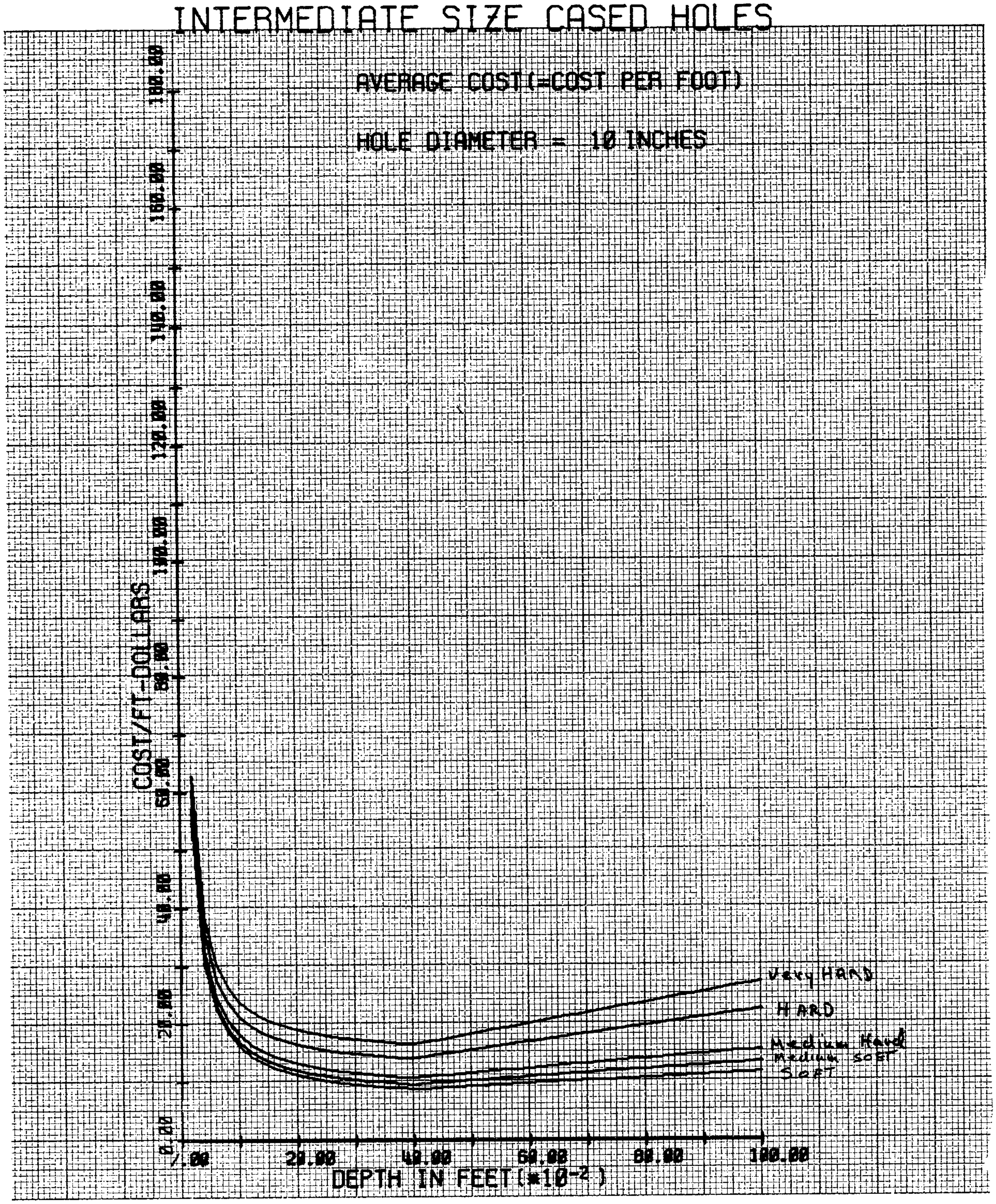
Y_{TC} (given ϕ = 41. in.)	Y_{AVC} (given ϕ = 41 in.)
125195.50	125.20
250129.86	125.06
384690.68	128.23
528877.95	132.22
682691.69	136.54
846131.88	141.02
1019198.50	145.60
1201891.60	150.24
1394211.20	154.91
1594625.70	159.46

Y_{TC} (given ϕ = 42 in.)	Y_{AVC} (given ϕ = 42 in.)
130197.07	130.20
259949.86	129.97
399525.57	133.18
548924.19	137.23
708145.74	141.63
877190.18	146.20
1056057.60	150.87
1244747.80	155.59
1443261.10	160.36
1643271.60	164.33

Y_{TC} (given ϕ = 43 in.)	Y_{AVC} (given ϕ = 43 in.)
135278.63	135.28
269929.83	134.96
414600.40	138.20
569290.36	142.32
733999.68	146.80
908728.39	151.45
1093476.50	156.21
1288243.90	161.03
1493030.70	165.89
1692462.00	169.25

Y_{TC} (given ϕ = 44 in.)	Y_{AVC} (given ϕ = 44 in.)
140440.16	140.44
280069.76	140.03
429915.19	143.31
589976.45	147.49
760253.55	152.05
940746.48	156.79
1131455.20	161.64
1332379.80	166.55
1543520.30	171.50
1742196.90	174.22

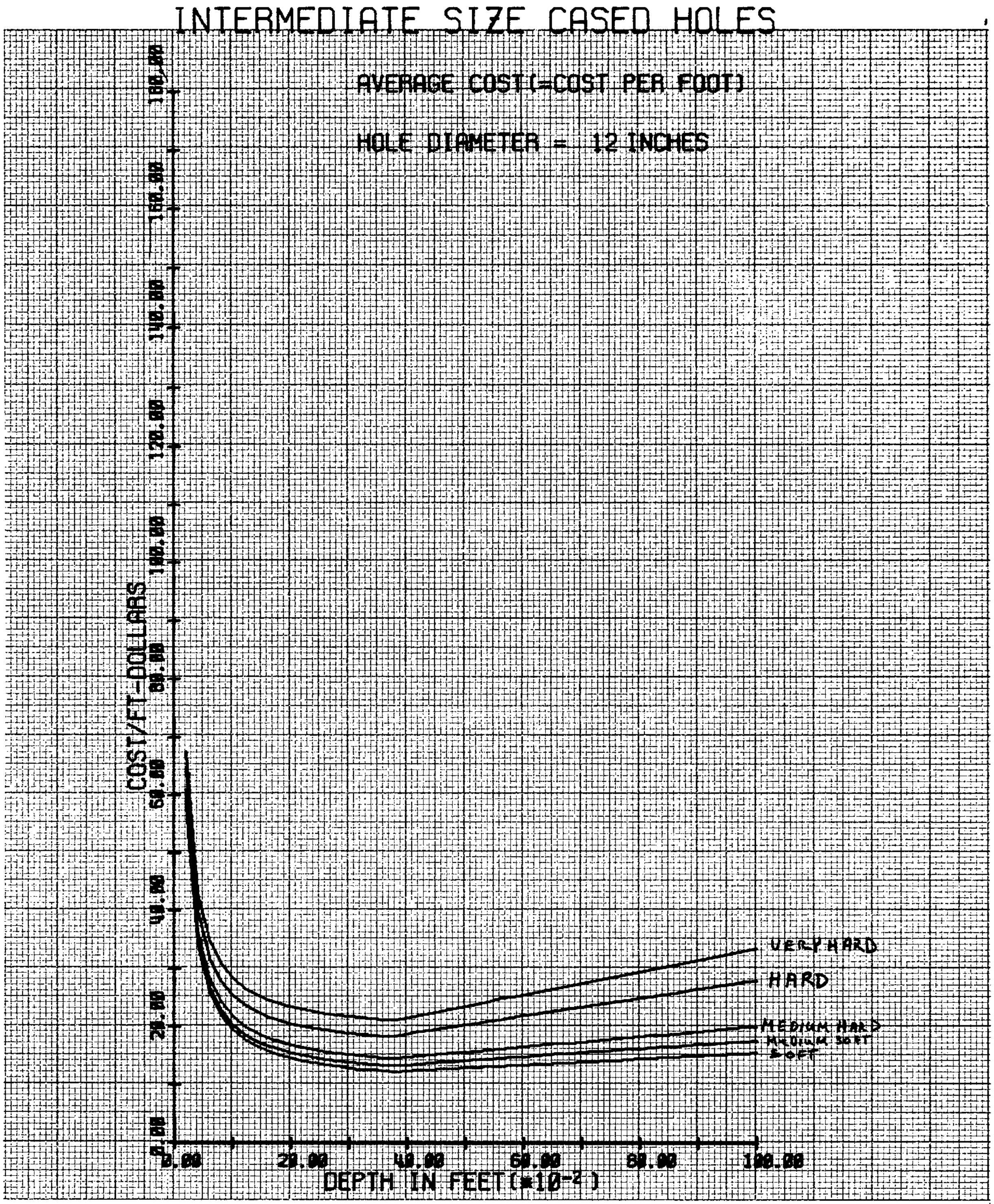
Y_{TC} (given ϕ = 45 in.)	Y_{AVC} (given ϕ = 45 in.)
145681.68	145.68
290369.65	145.18
445469.93	148.49
610982.48	152.75
786907.34	157.38
973244.47	162.21
1169993.90	167.14
1377155.60	172.14
1594729.60	177.19
1792476.20	179.25



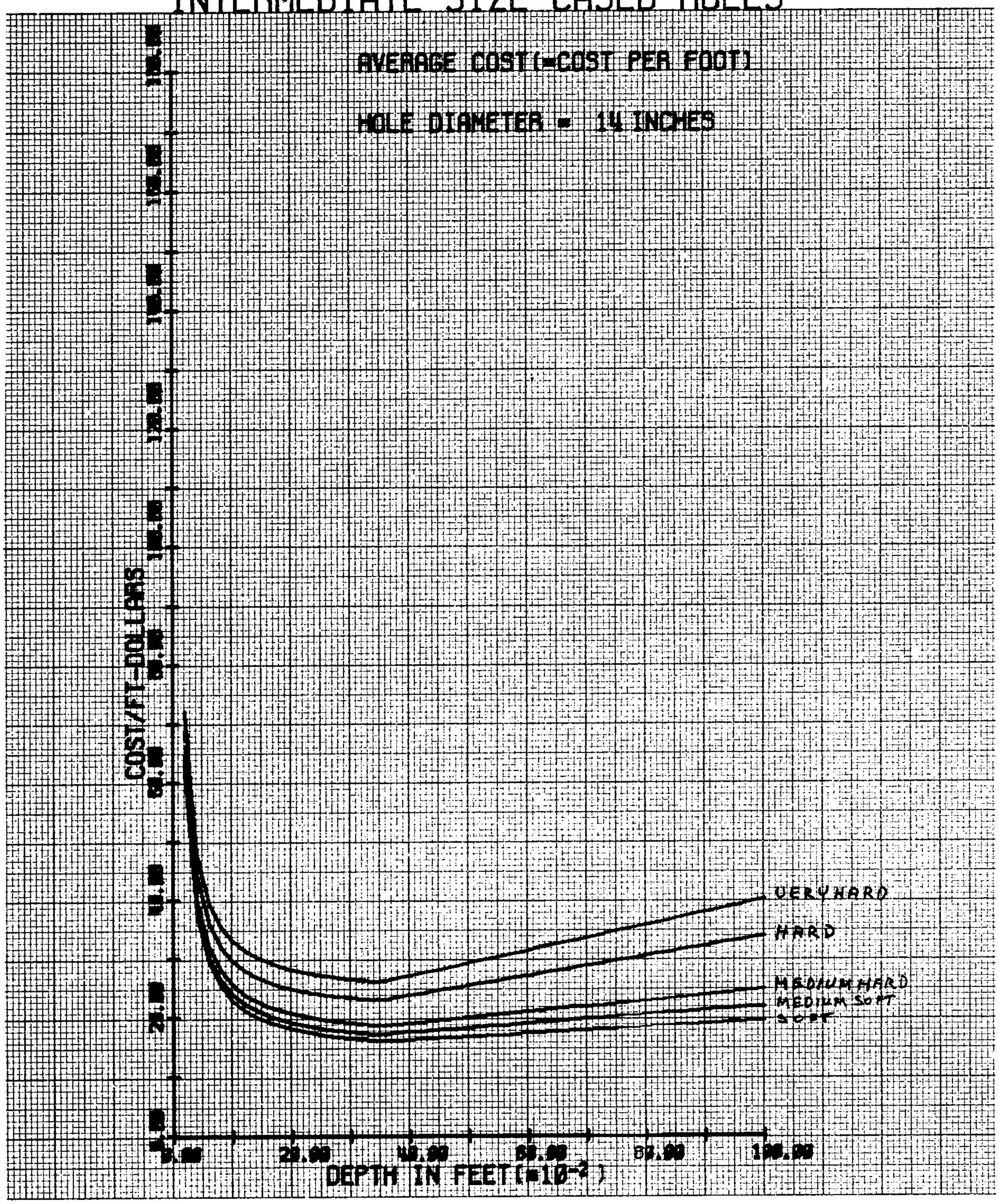
INTERMEDIATE SIZE CASED HOLES
AVERAGE COST(=COST PER FOOT)
HOLE DIAMETER = 10 INCHES
COST/FT-DOLLARS
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
1.00
20.00
40.00
60.00
80.00
100.00
DEPTH IN FEET(*10^-2)
Very HARD
HARD
Medium Hard
Medium soft
Soft

NO. 02

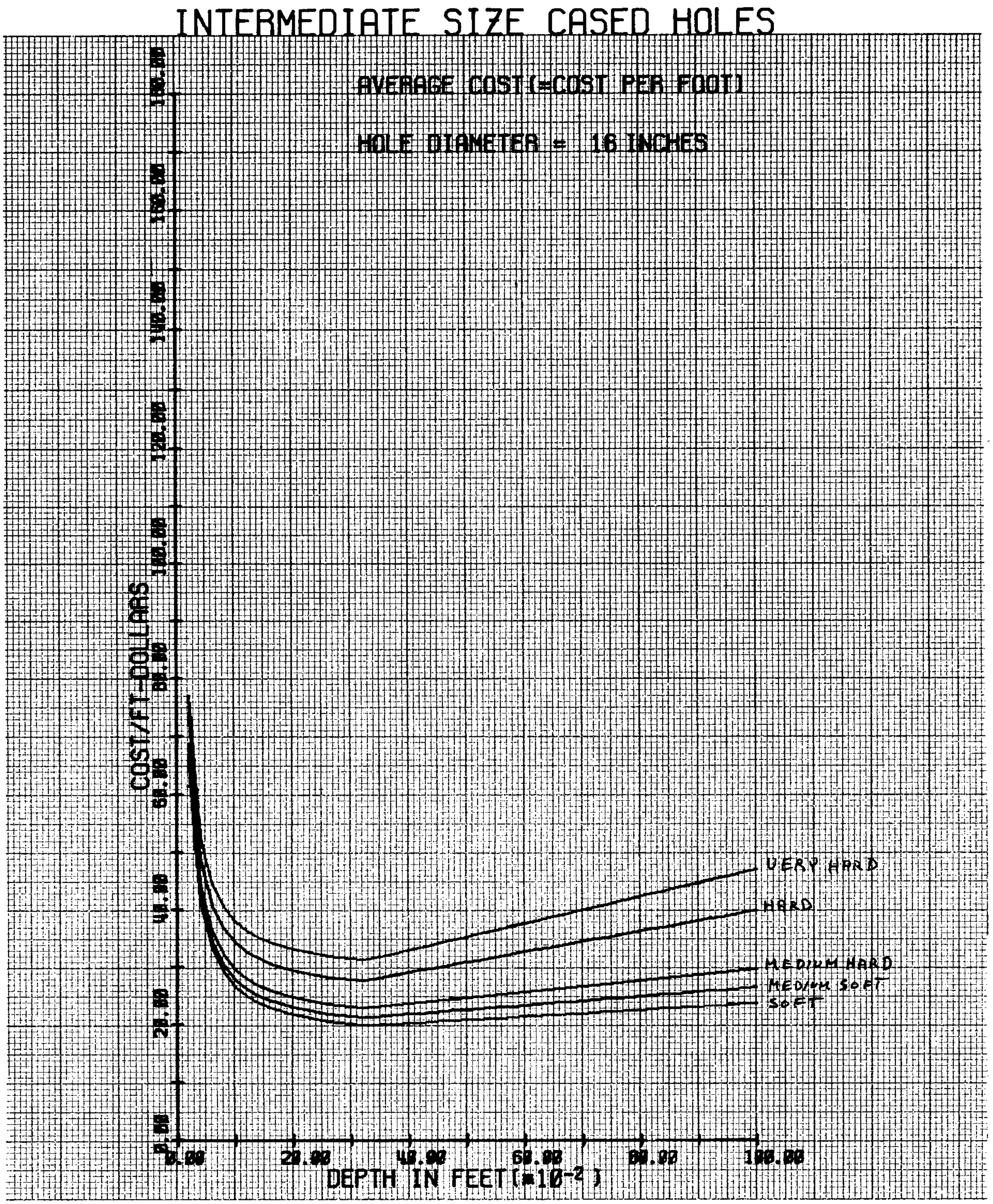
INTERMEDIATE SIZE CASED HOLE COST AS A
FUNCTION OF THE OUTSIDE HOLE DIAMETER FOR
1,000 to 10,000 FEET DEPTH


INTERMEDIATE SIZE CASED HOLES
AVERAGE COST(=COST PER FOOT)
HOLE DIAMETER = 12 INCHES
COST/FT-DOLLARS
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
0.00
20.00
40.00
60.00
80.00
100.00
DEPTH IN FEET(*10⁻²)
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT

INTERMEDIATE SIZE CASED HOLES

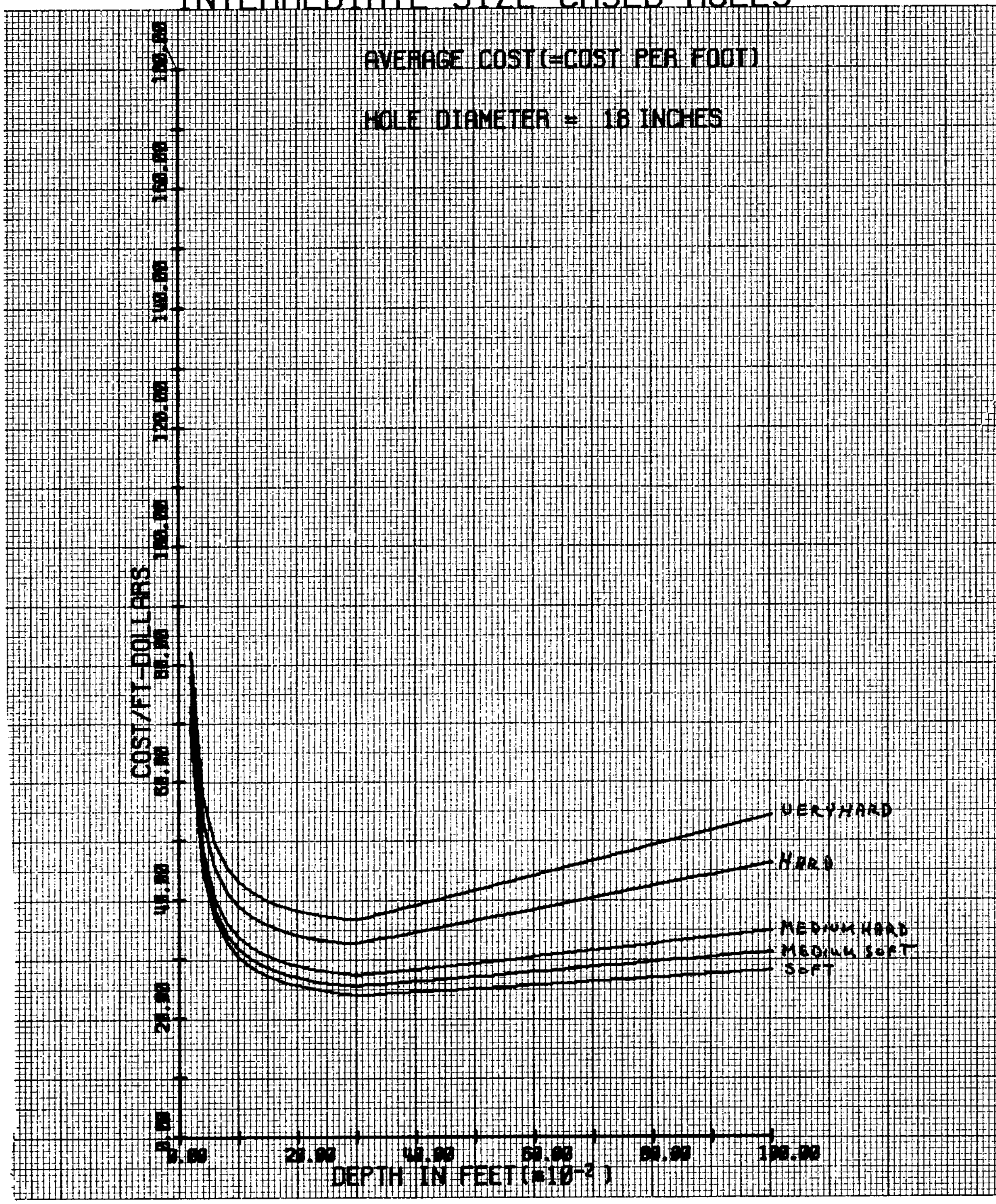


RECORDING CHARTS GRAPHIC CONTROLS CORP

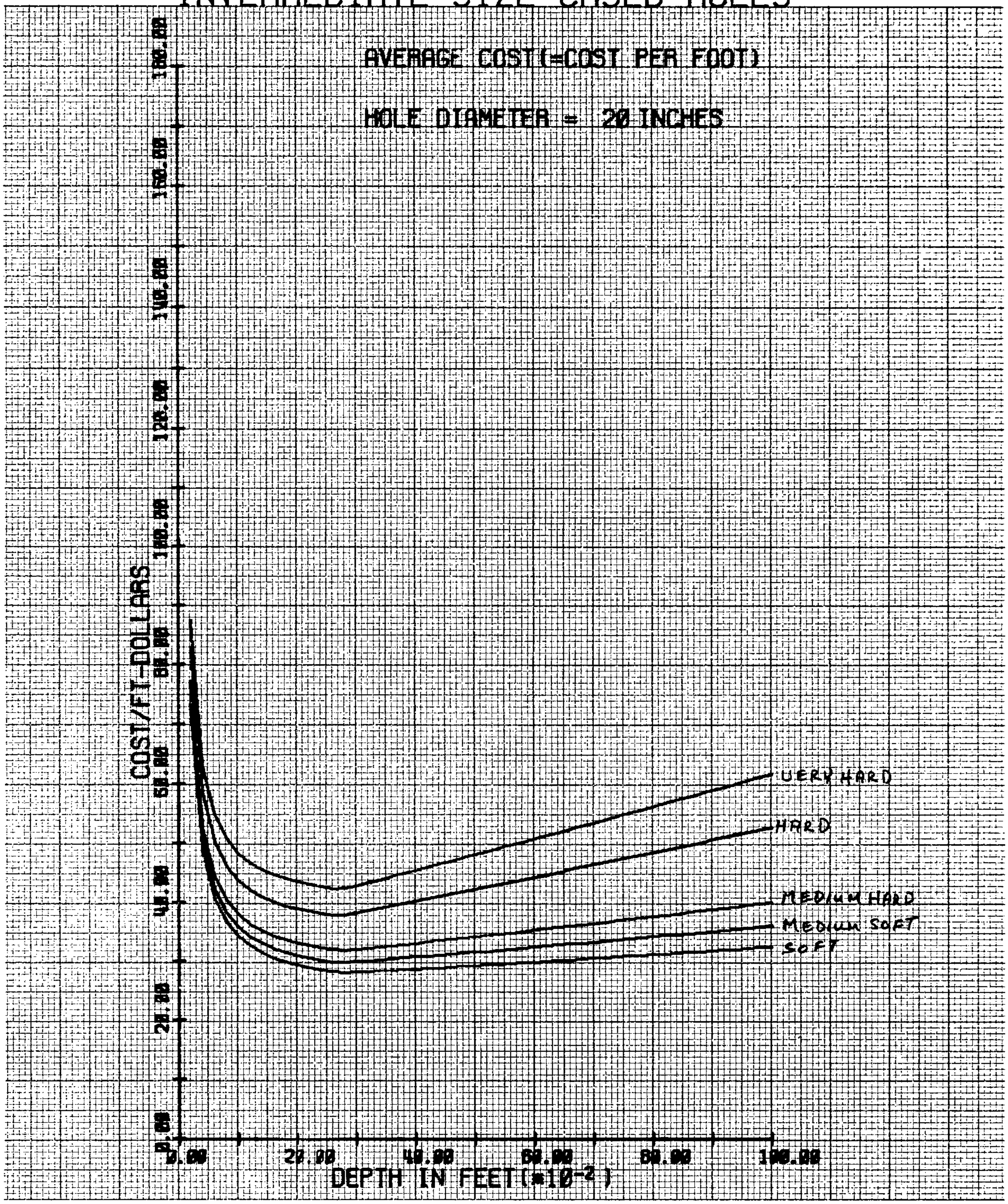


PRINTED IN U.S.A. NO. 02

INTERMEDIATE SIZE CASED HOLES

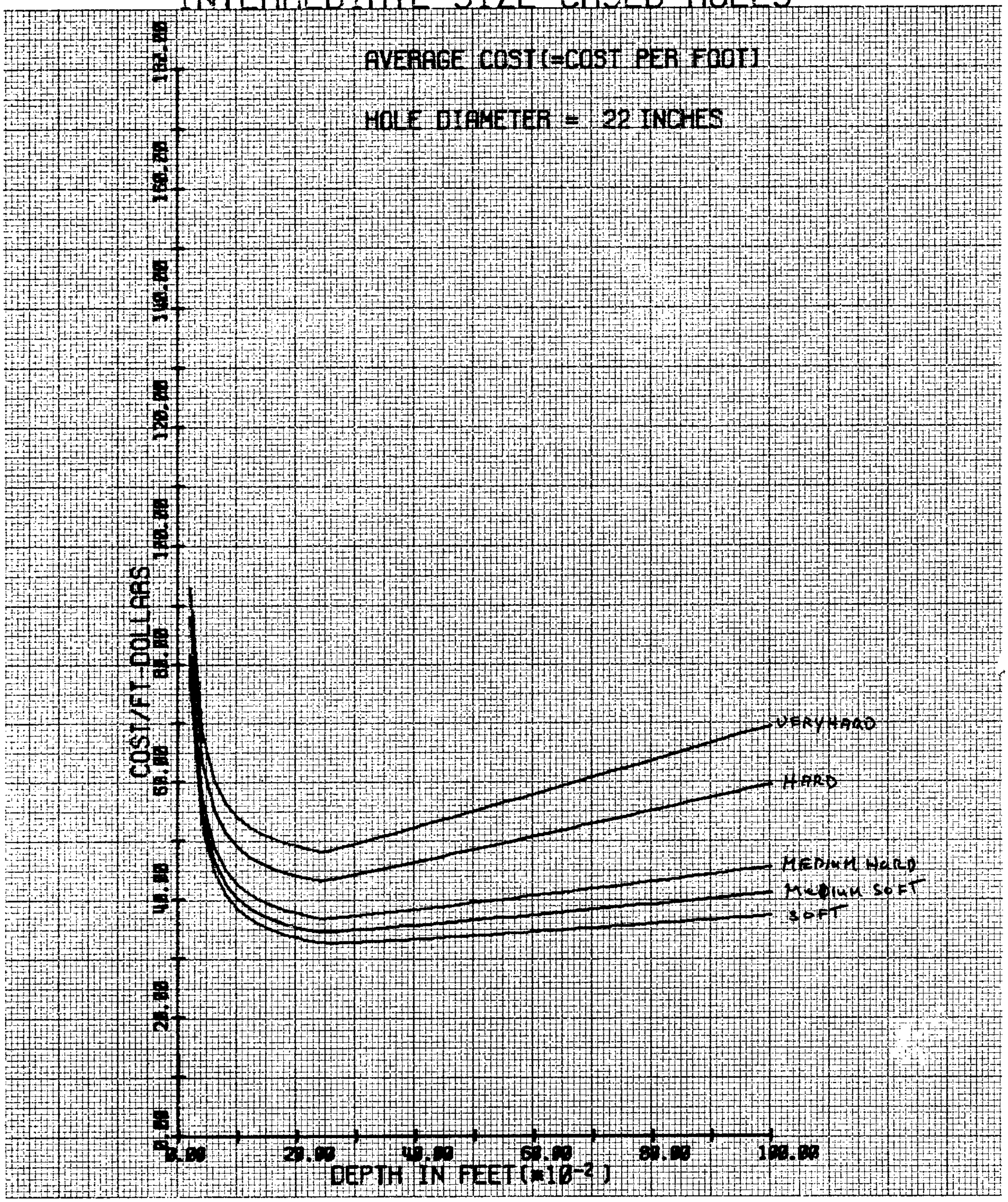


INTERMEDIATE SIZE CASED HOLES



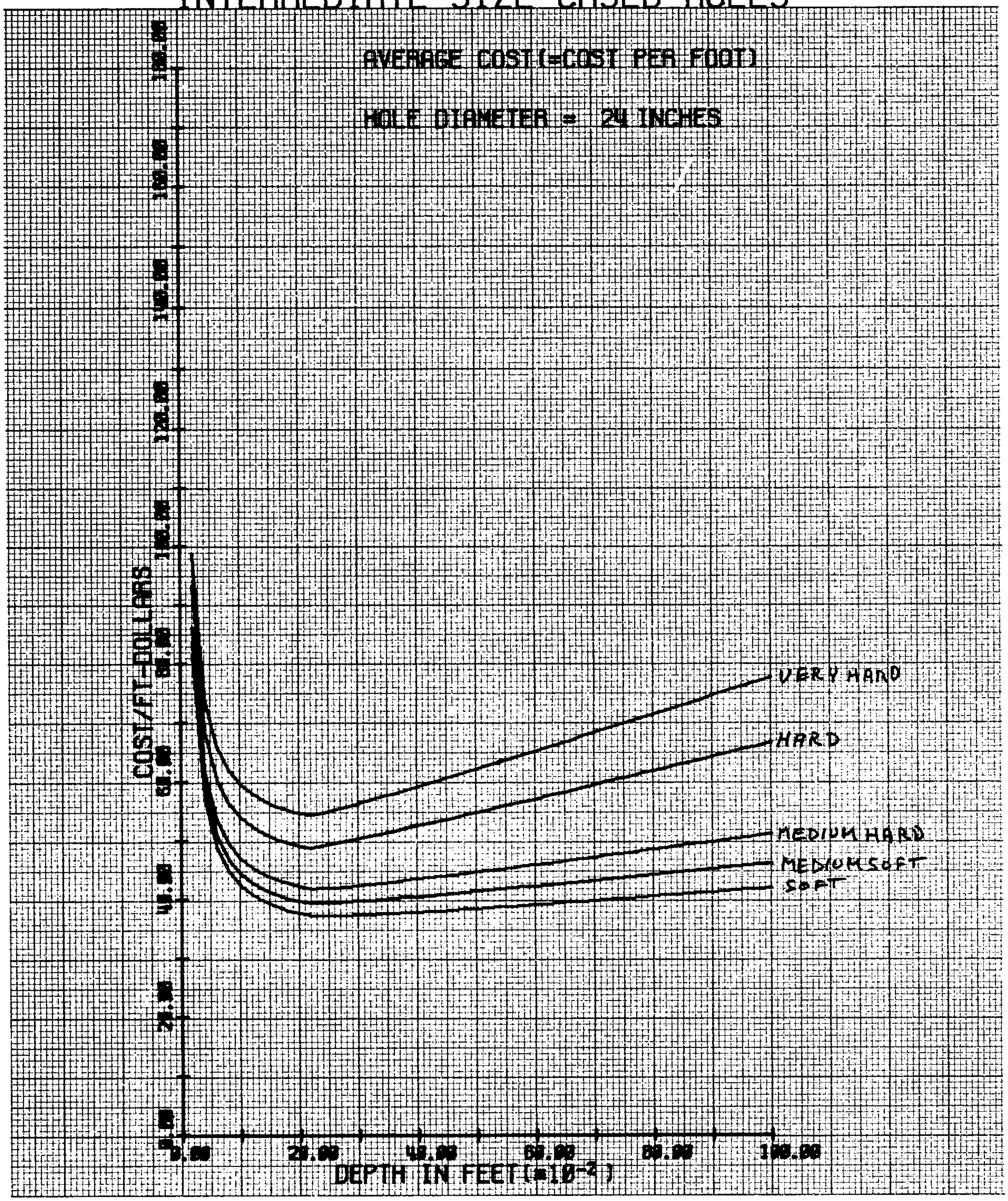
PRINTED IN U.S.A No. O2

INTERMEDIATE SIZE CASED HOLES

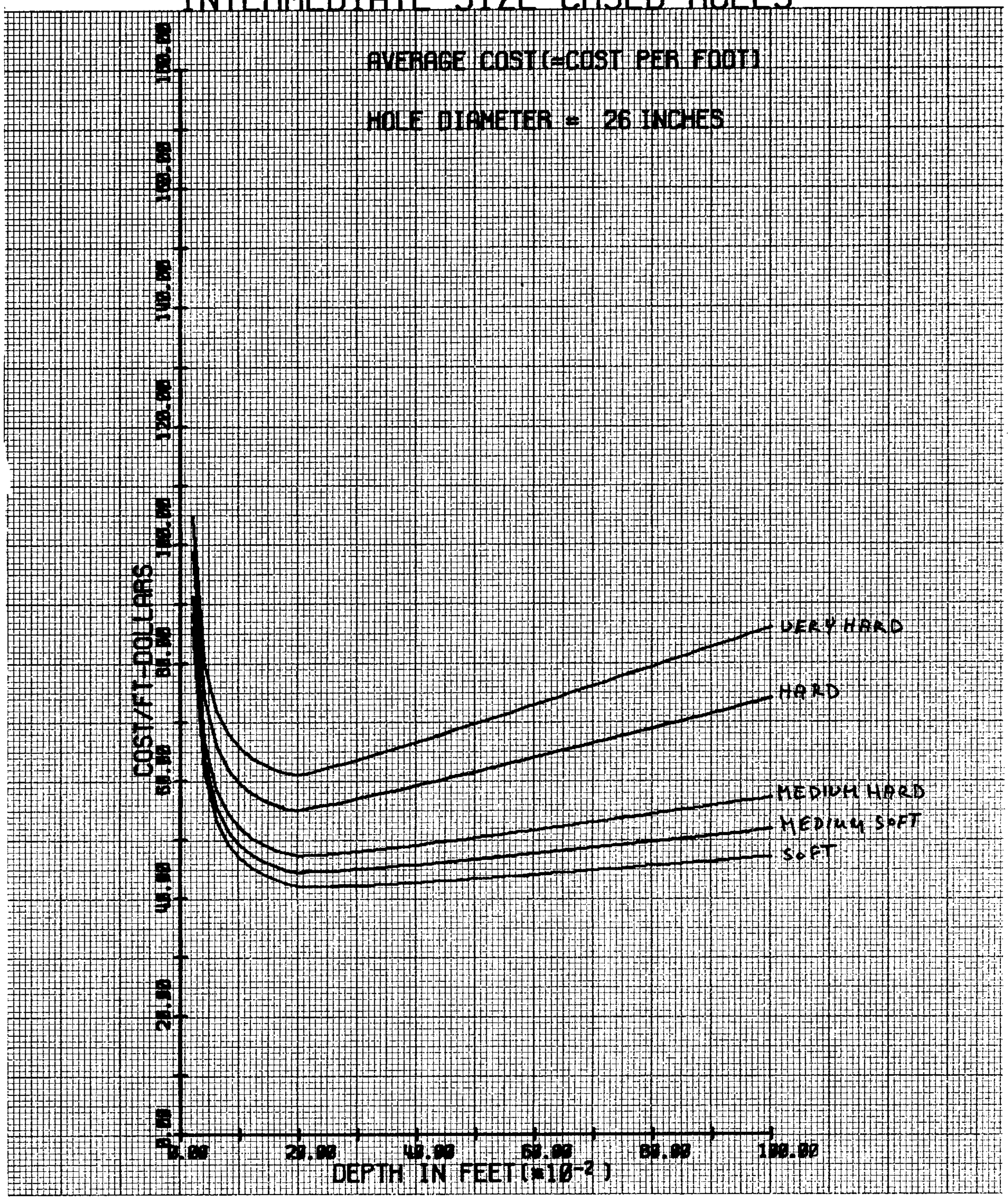


CONTROLS CORPORATION BUFFALO, NEW YORK

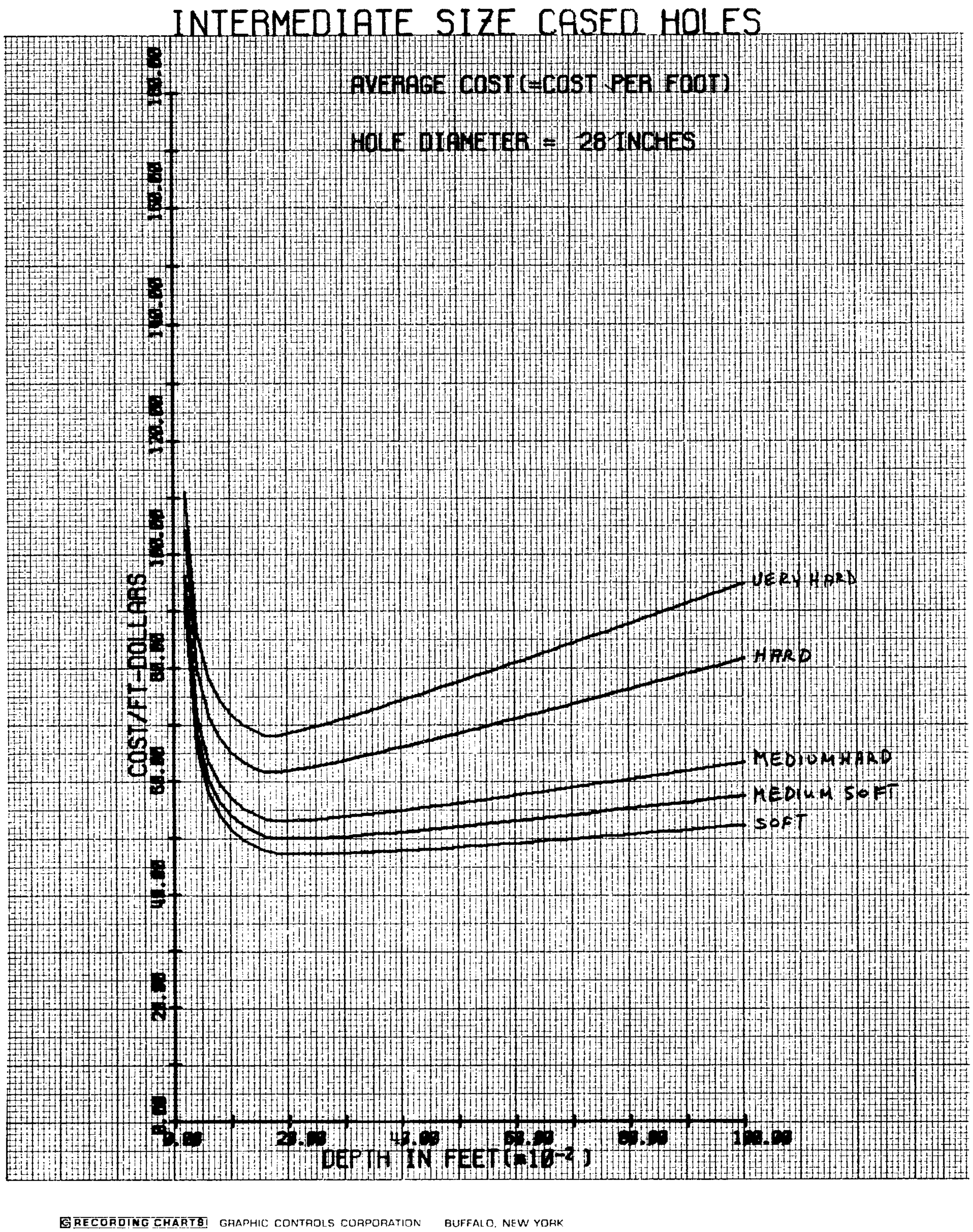
INTERMEDIATE SIZE CASED HOLES



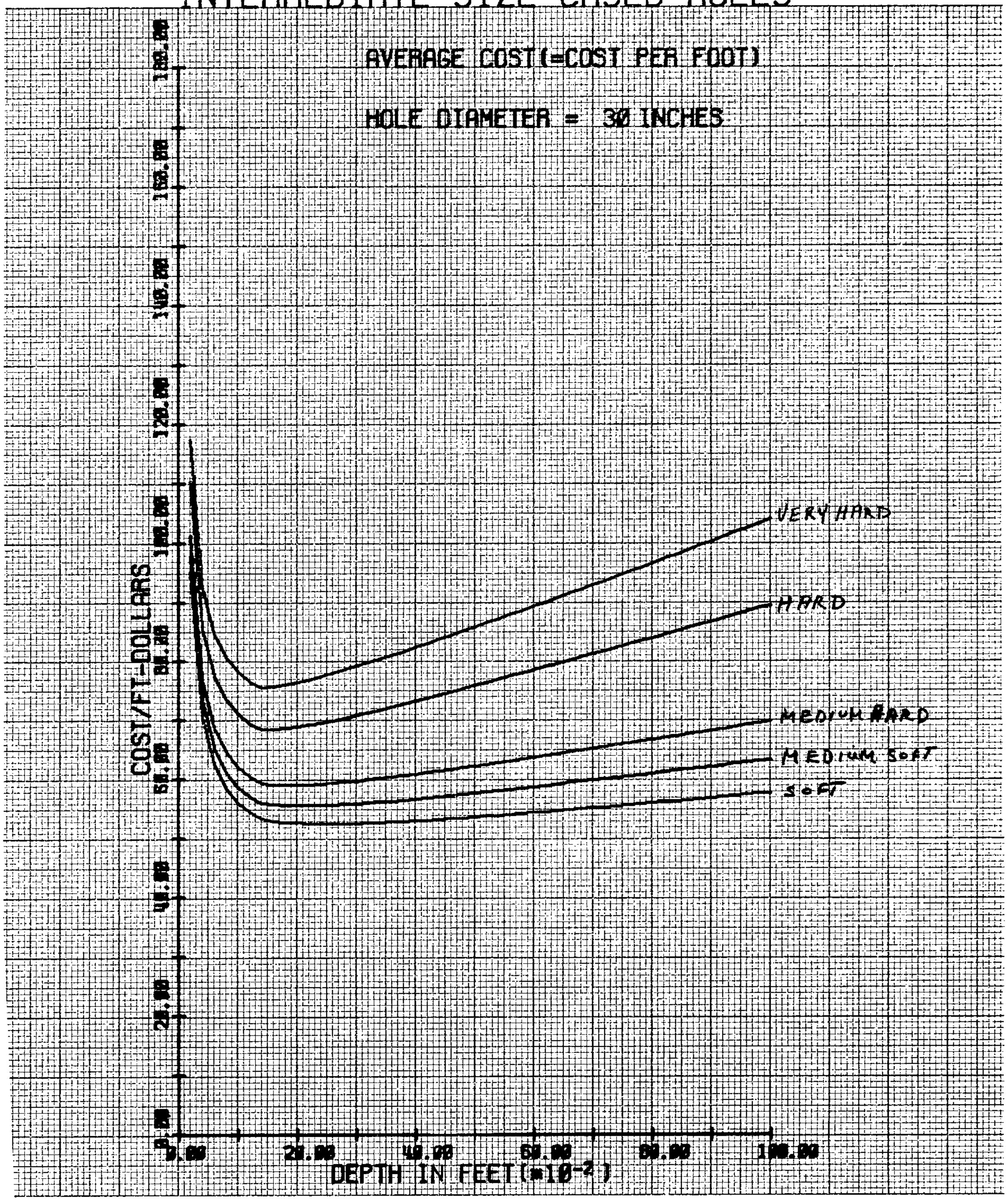
INTERMEDIATE SIZE CASED HOLES



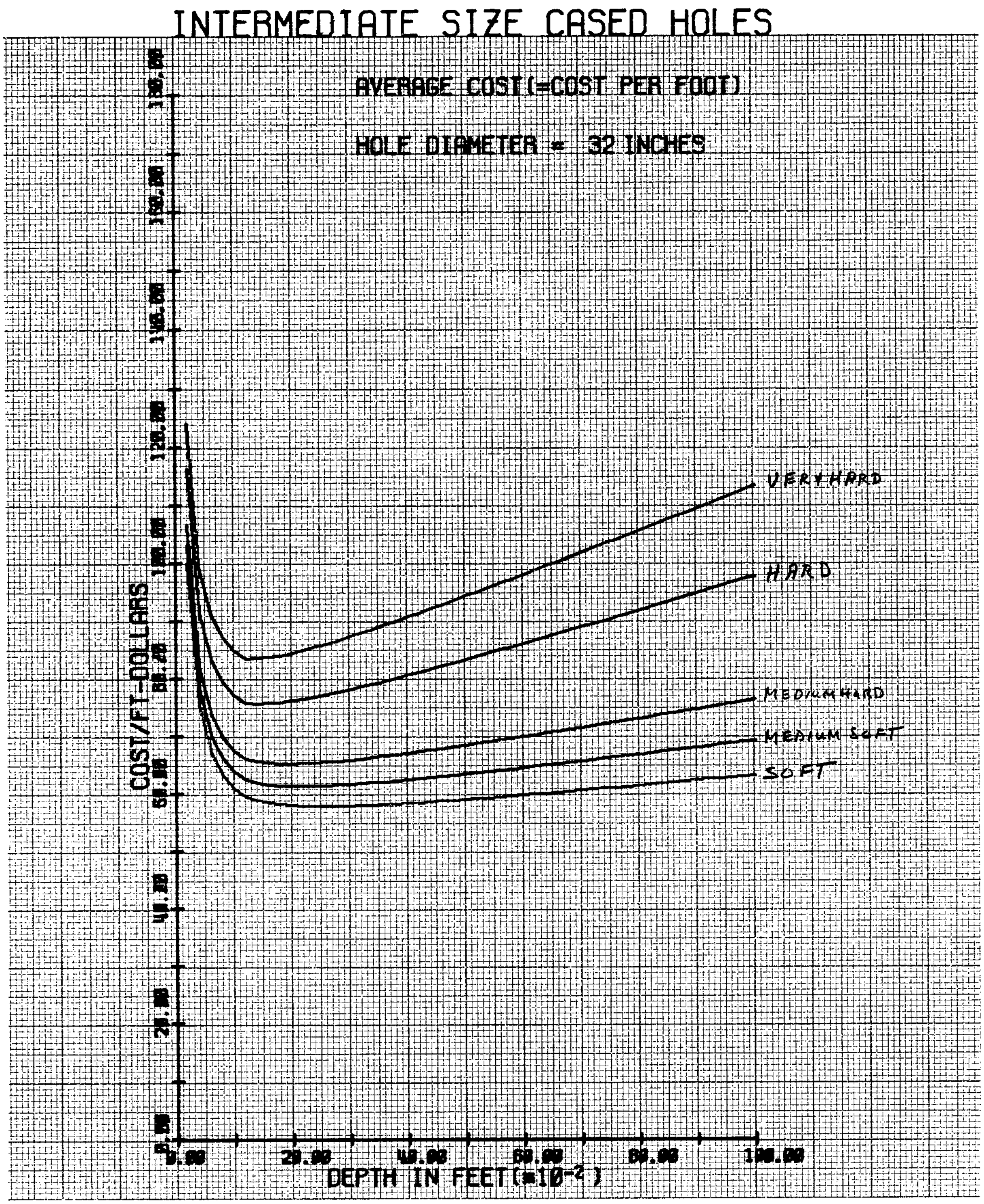
PRINTED IN U.S.A. NO. 02


INTERMEDIATE SIZE CASED HOLES
AVERAGE COST(=COST PER FOOT)
HOLE DIAMETER = 28 INCHES
COST/FT-DOLLARS
DEPTH IN FEET(*10^-2)
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT
RECORDING CHARTS GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

INTERMEDIATE SIZE CASED HOLES

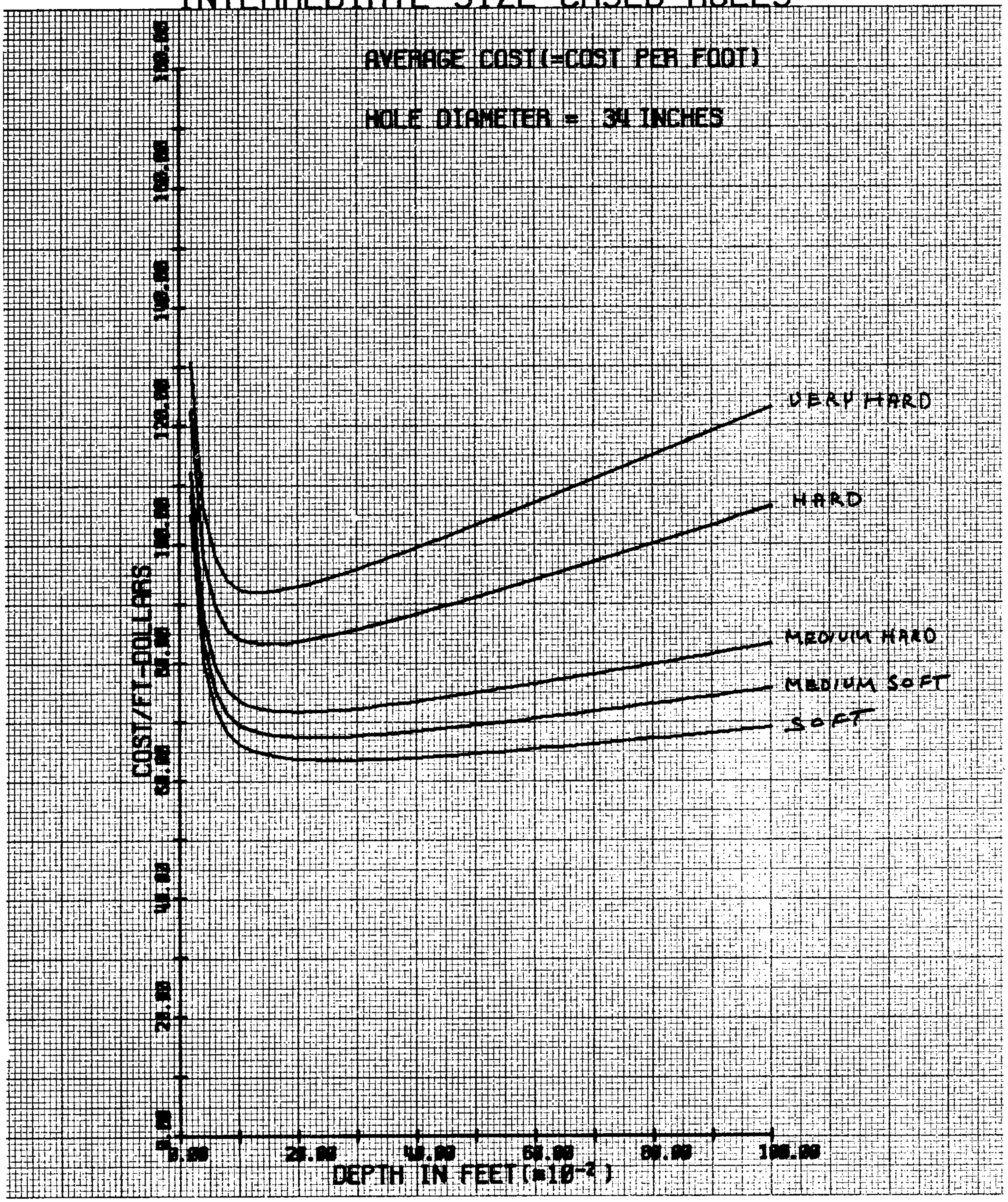


PRINTED IN U.S.A. No. 02

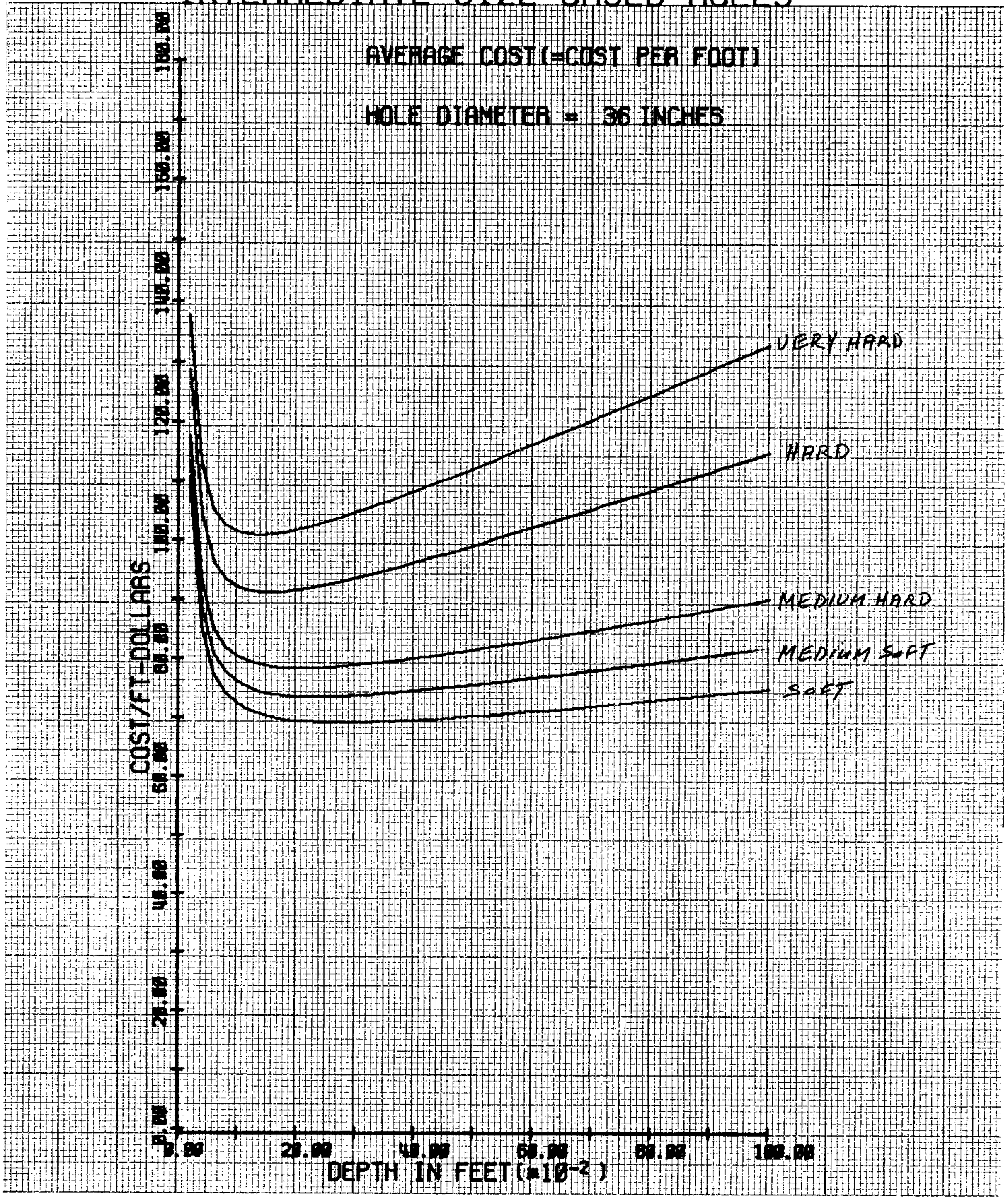


'RATION BUFFALO, NEW YORK PRINTED IN U.S.A

INTERMEDIATE SIZE CASED HOLES

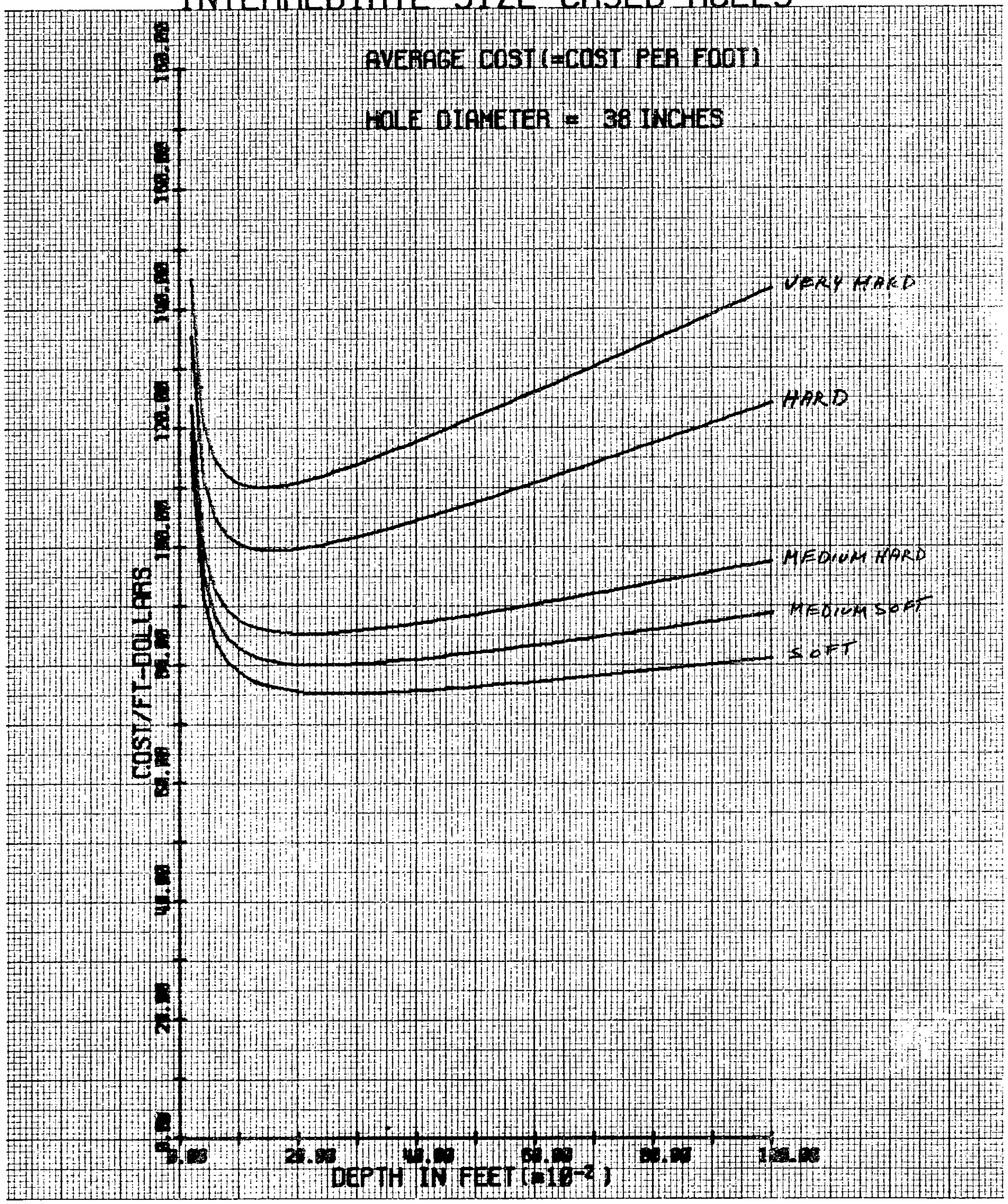


INTERMEDIATE SIZE CASED HOLES



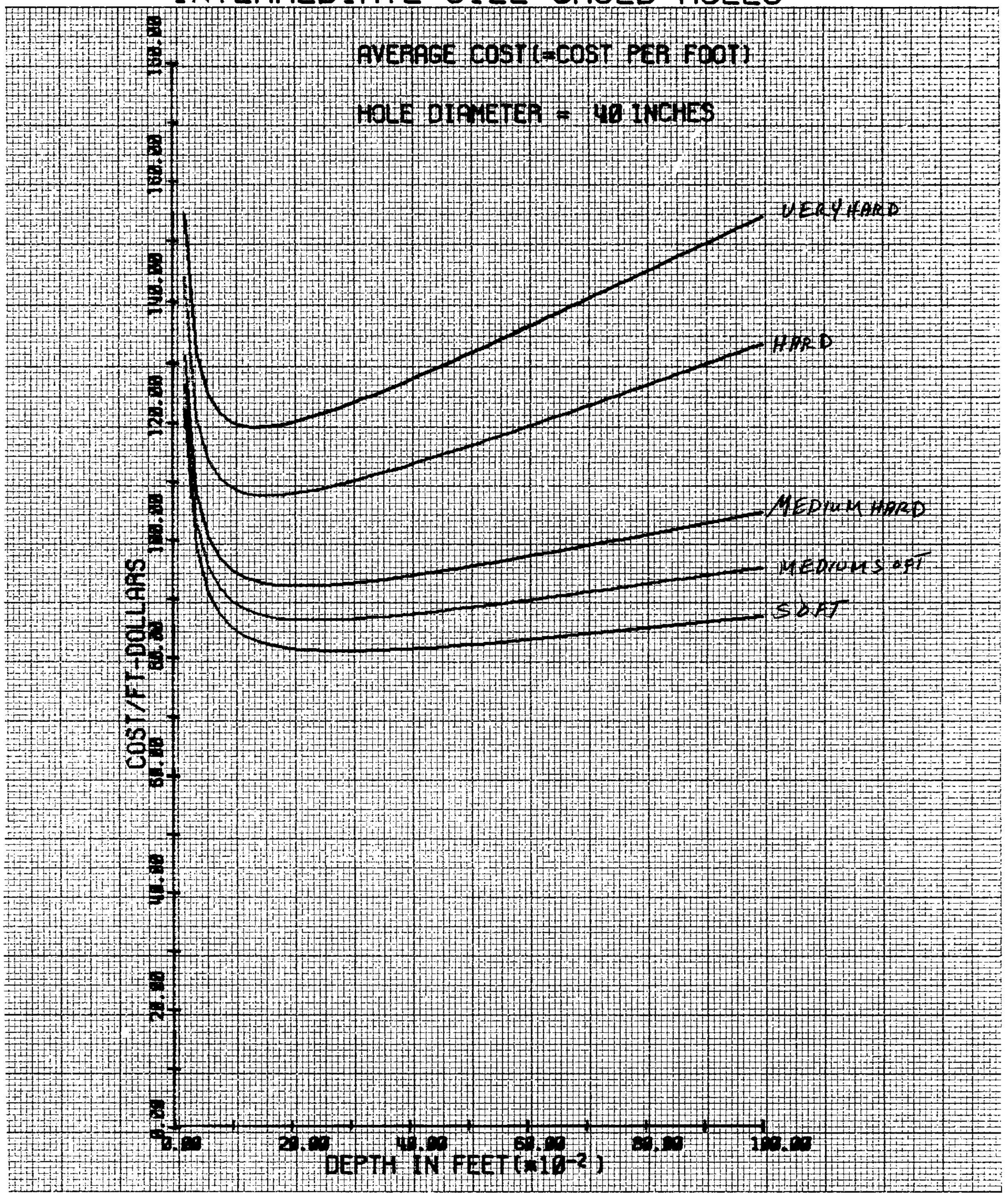
PRINTED IN U.S.A. No. 02

INTERMEDIATE SIZE CASED HOLES



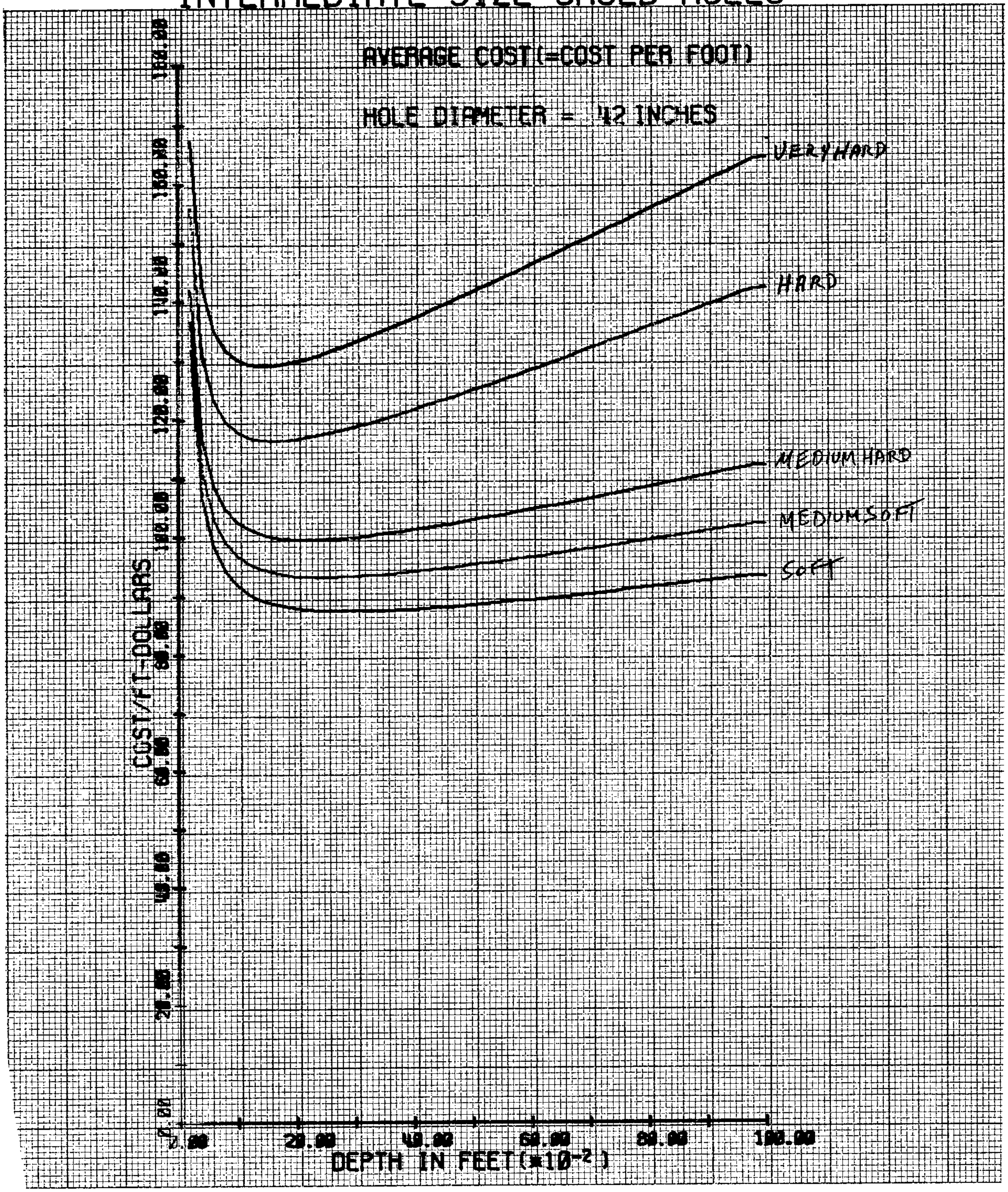
RECORDING CHARTS GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

INTERMEDIATE SIZE CASED HOLES

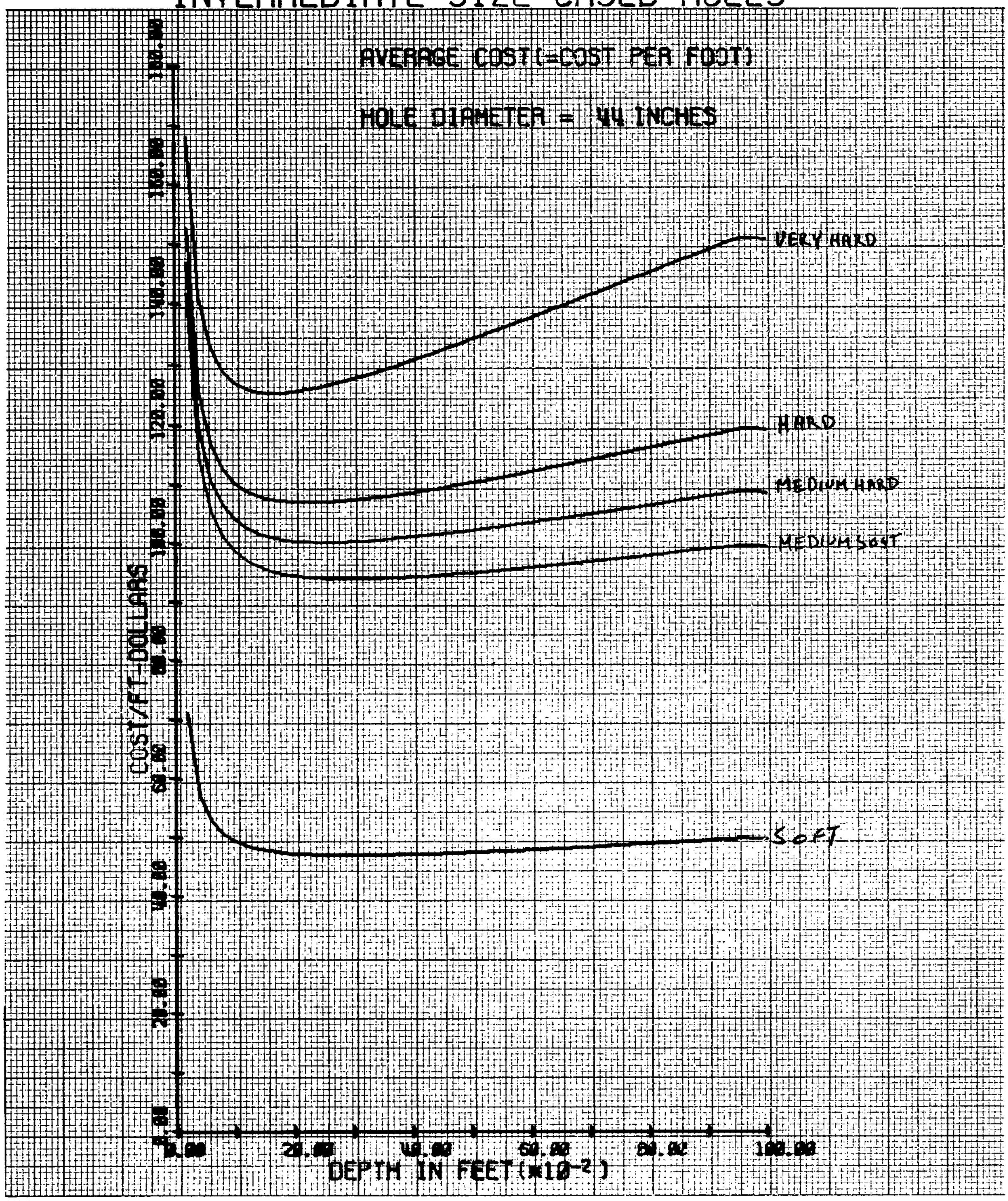


02 RECORDING CHARTS GRAPHIC

INTERMEDIATE SIZE CASED HOLES



INTERMEDIATE SIZE CASED HOLES



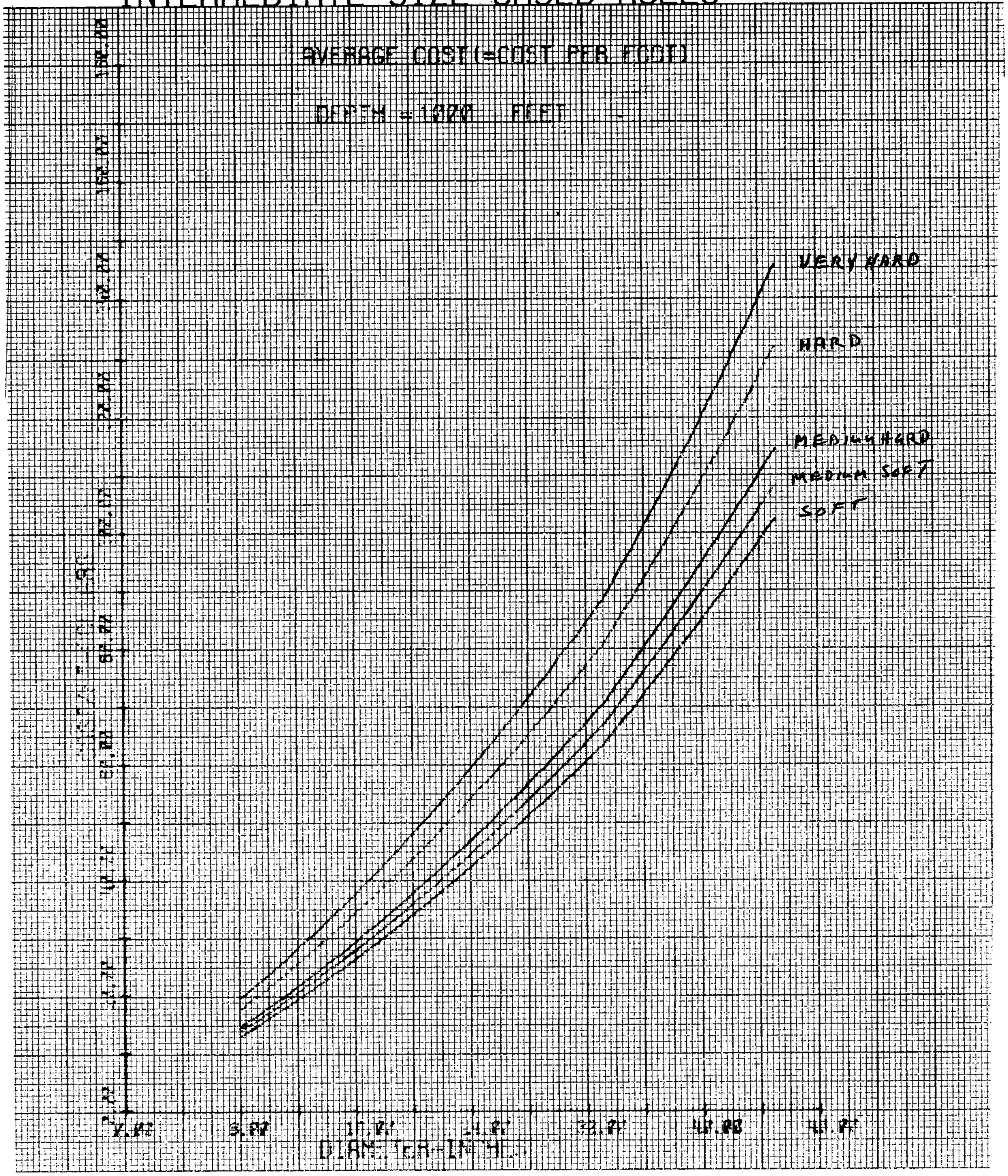
INTERMEDIATE SIZE CASED HOLE COST

AS A FUNCTION OF DEPTH FOR

10 INCHES TO 45 INCHES OUTSIDE DIAMETERS

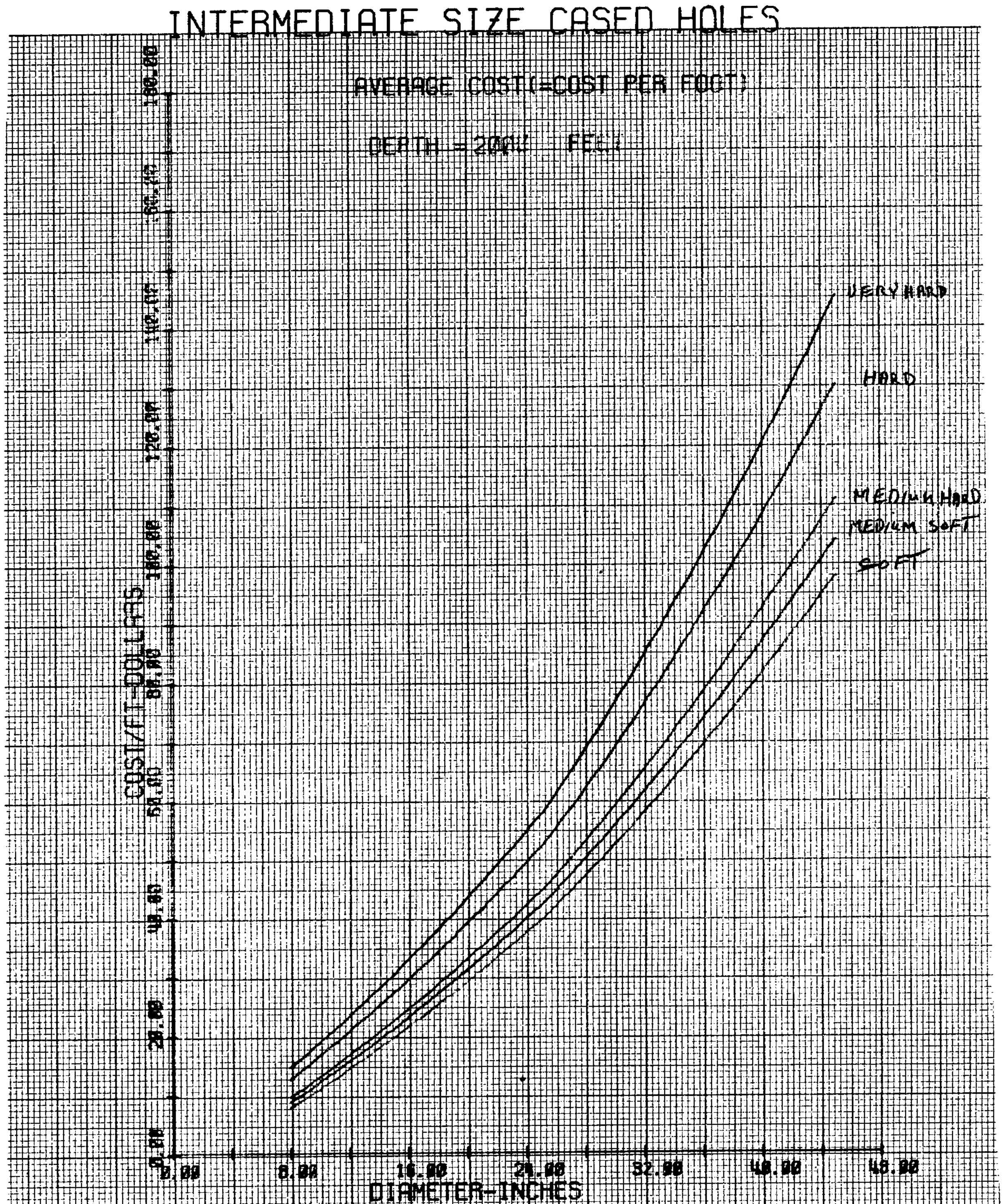
(≈8 INCHES TO 30 INCHES INSIDE DIAMETERS)

INTERMEDIATE SIZE CASED HOLES

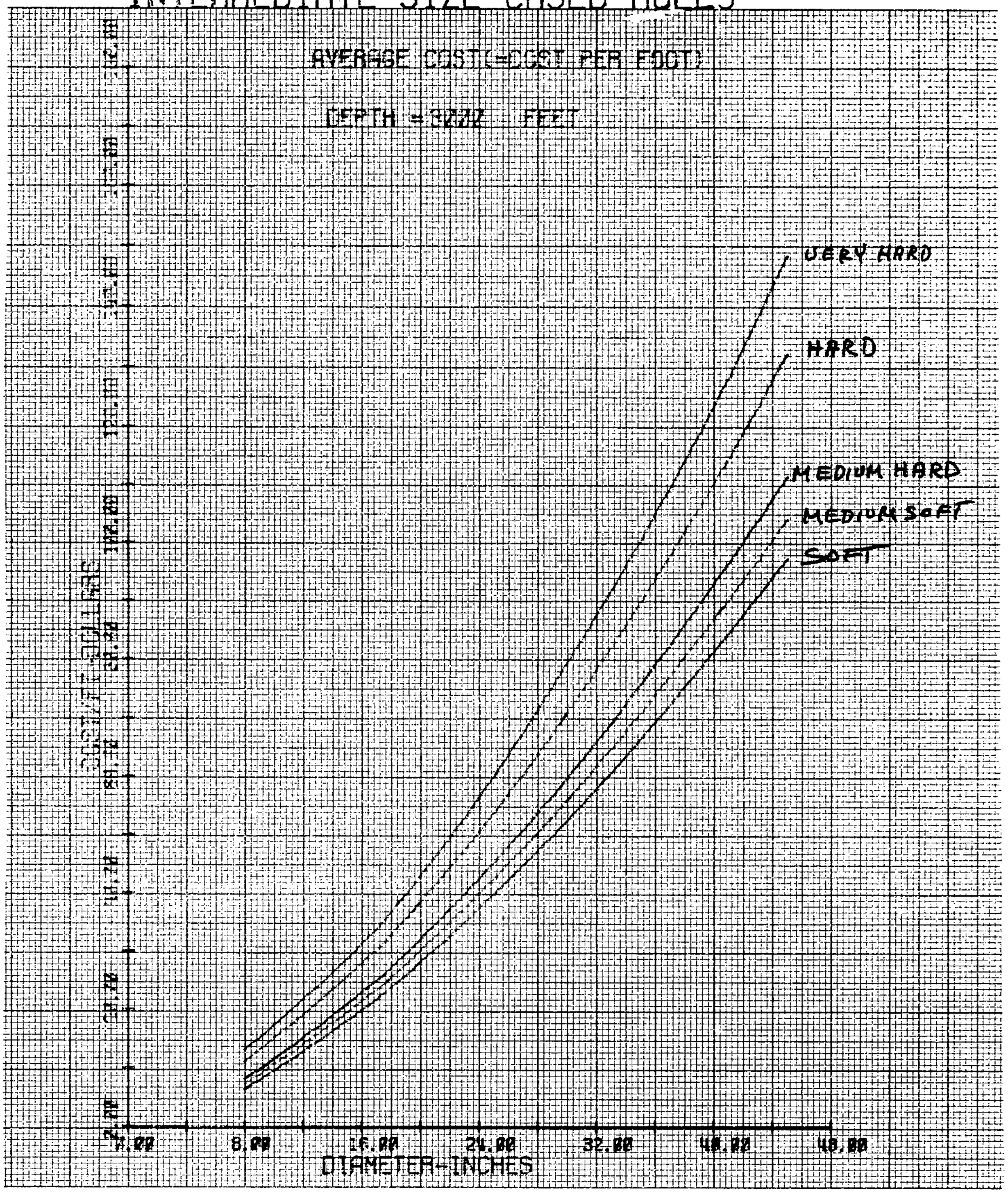


PRINTED IN U.S.A

NO. 02

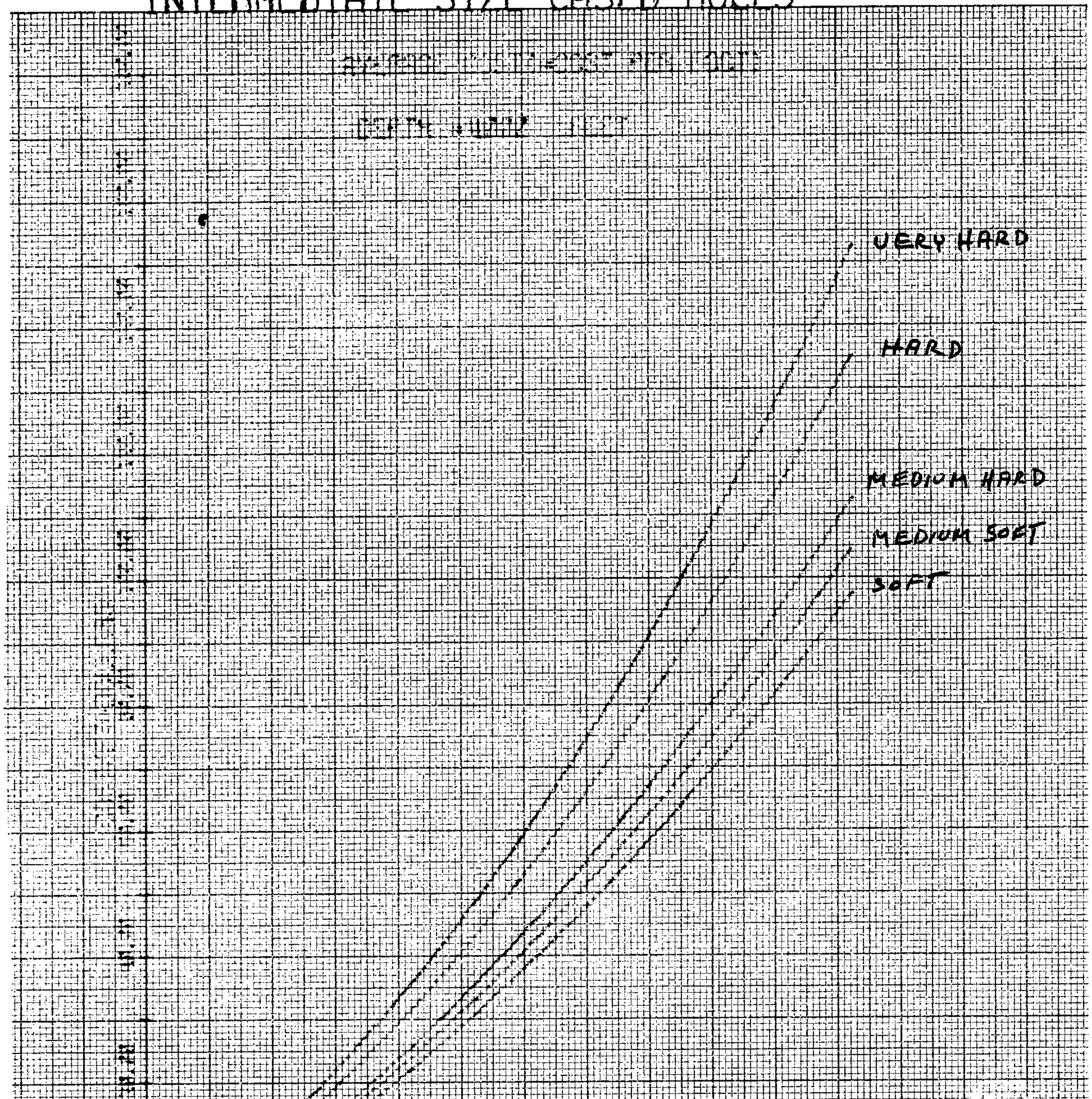

INTERMEDIATE SIZE CASED HOLES
AVERAGE COST(=COST PER FOOT)
DEPTH = 2000 FEET
COST/FT-DOLLARS
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
DIAMETER-INCHES
0.00
8.00
16.00
24.00
32.00
40.00
48.00
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT

INTERMEDIATE SIZE CASED HOLES



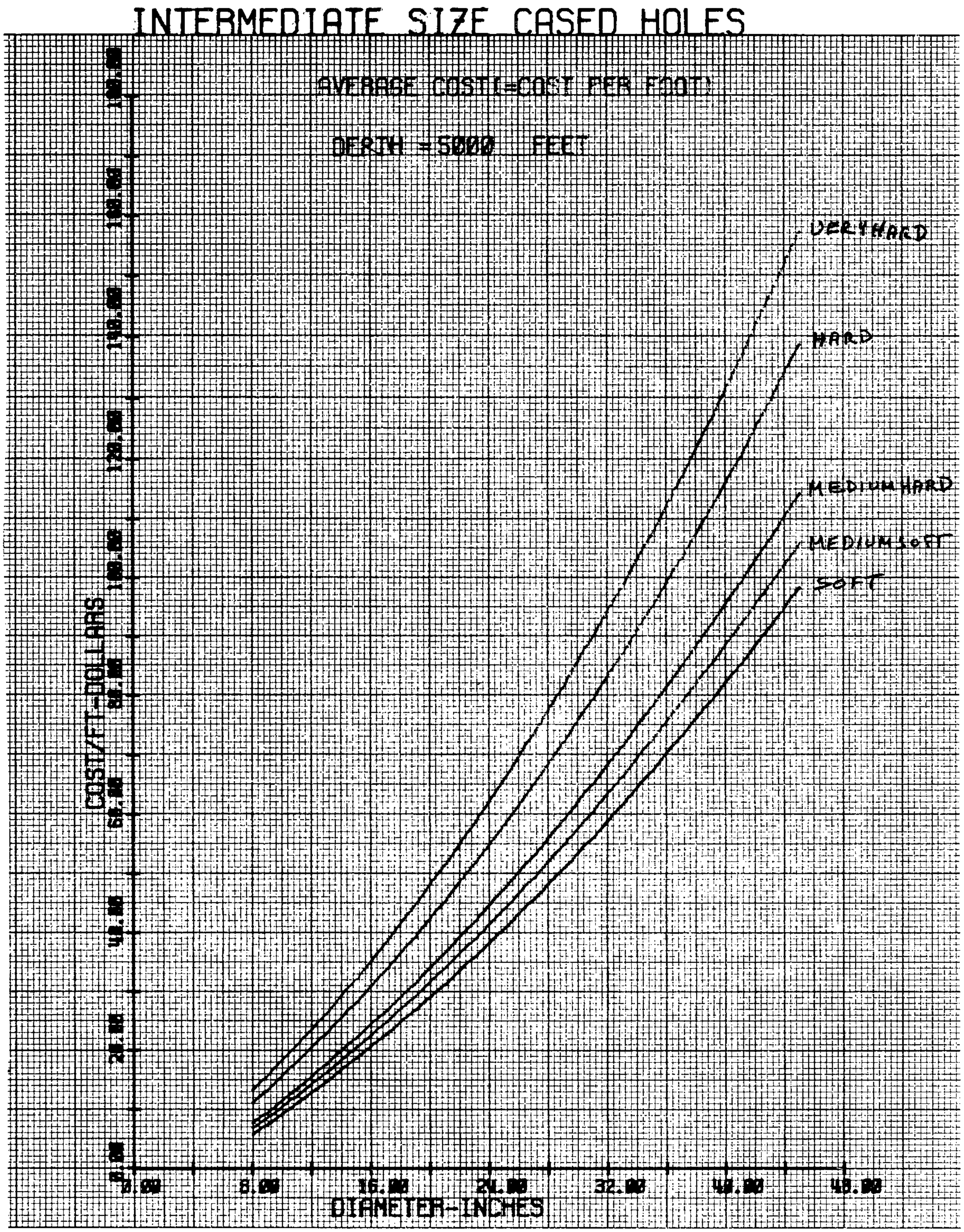
PRINTED IN U.S.A. No. 02

INTERMEDIATE SIZE CASED HOLES



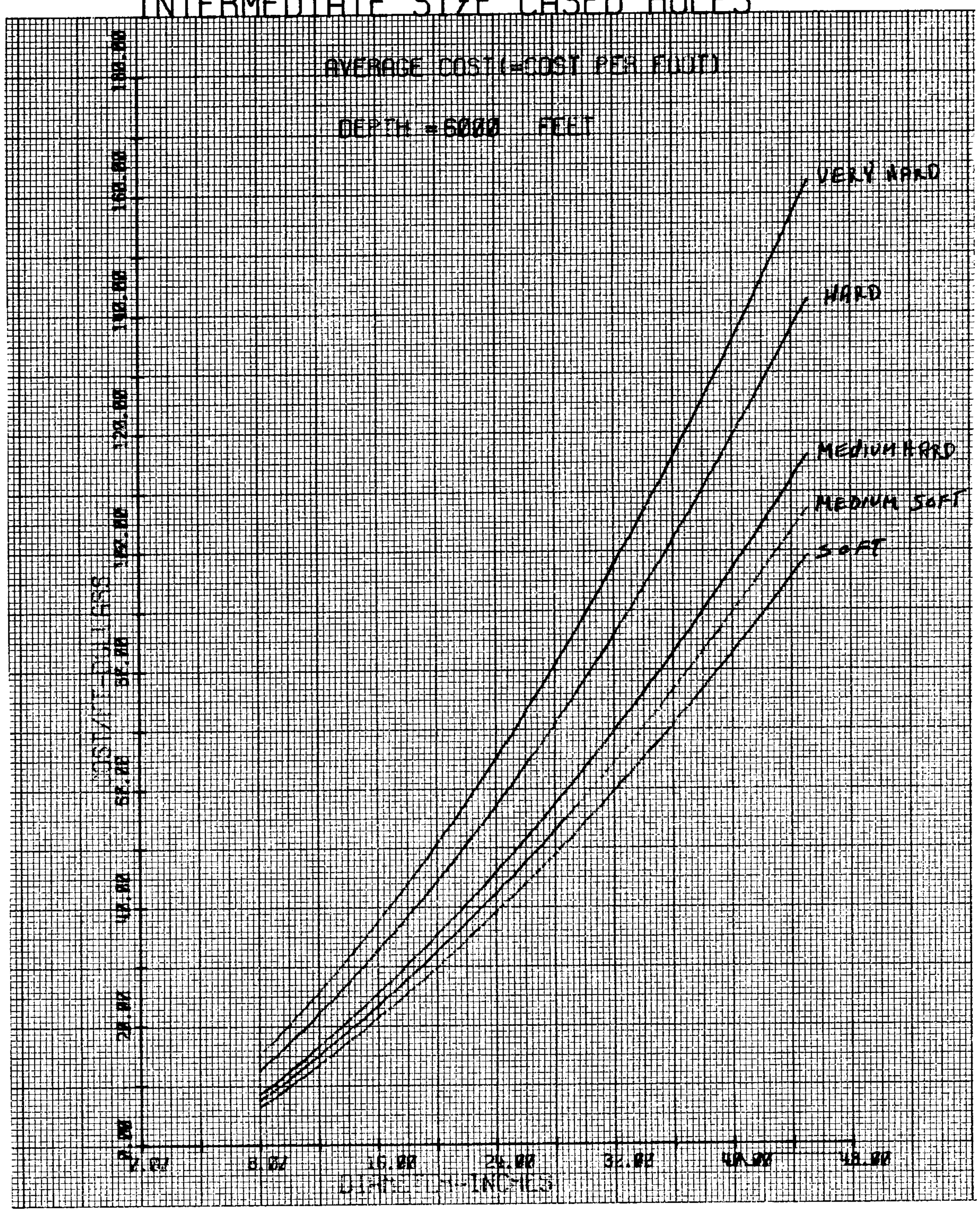
PRINTED IN U.S.A

No. 02



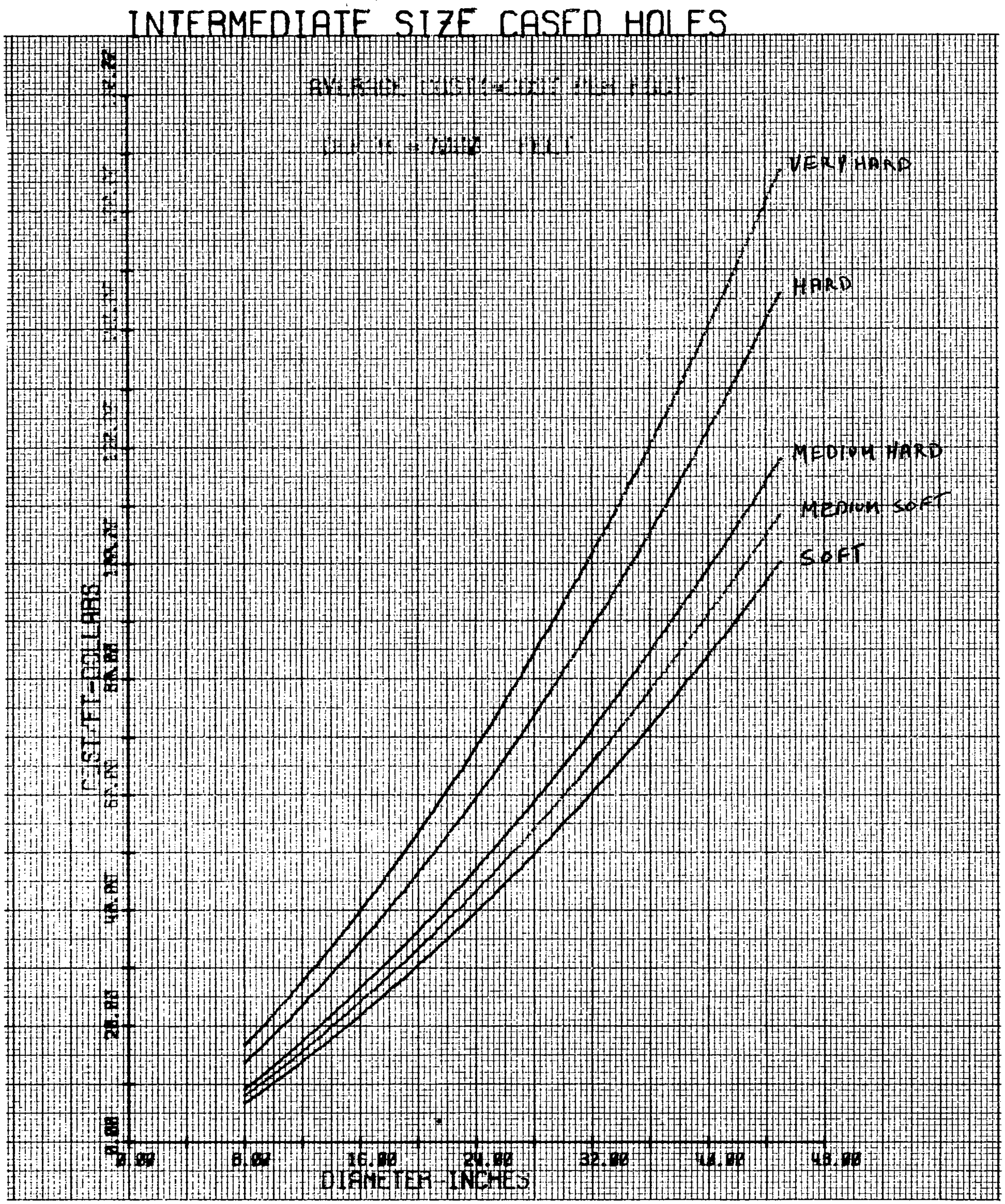
RECORDING CHARTS GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

INTERMEDIATE SIZE CASED HOLES



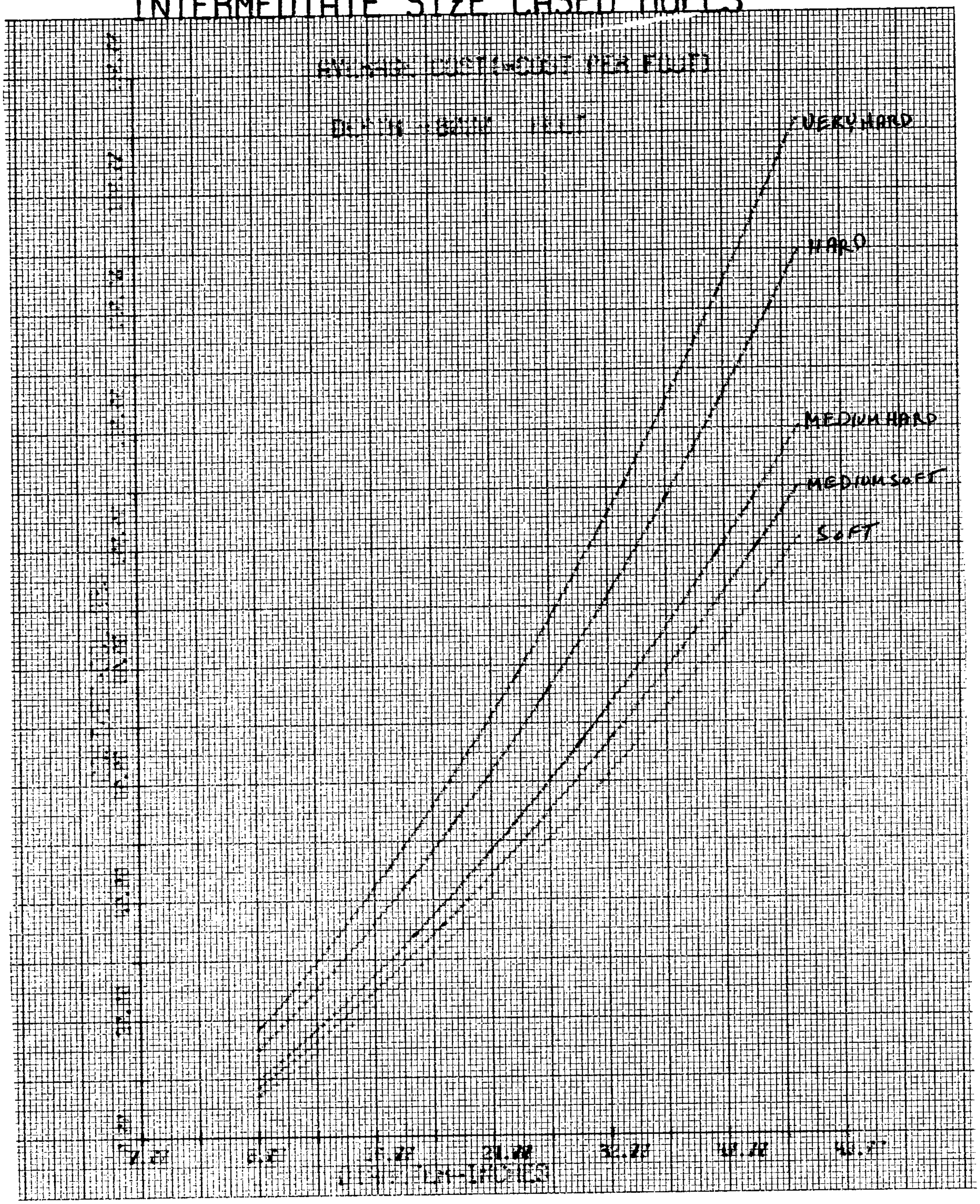
PRINTED IN U.S.A.

No. 02

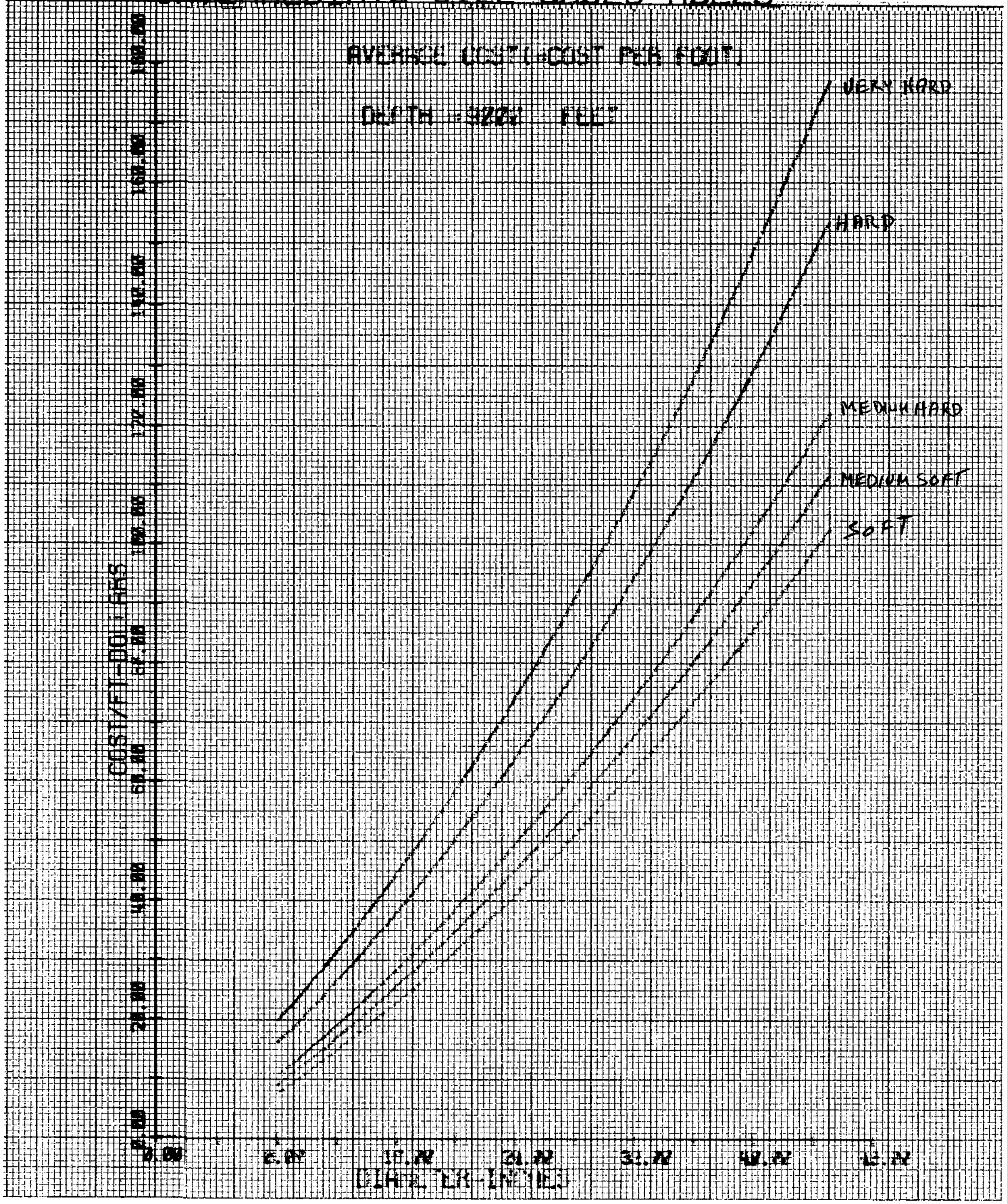


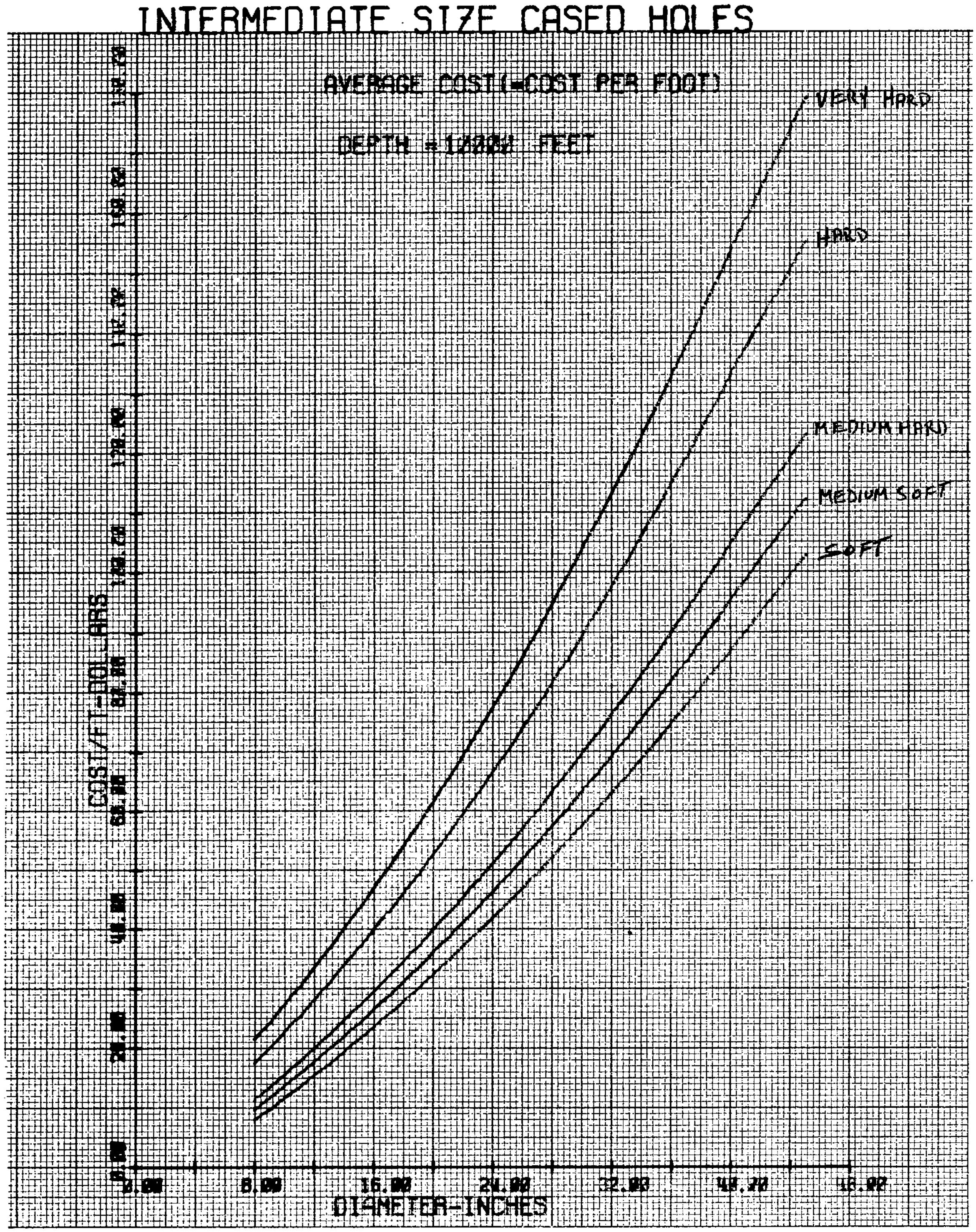
CONTROLS CORPORATION BUFFALO, NEW YORK

INTERMEDIATE SIZE CASED HOLES



INTERMEDIATE SIZE CASED HOLES





RECORDING CHARTS GRAPHIC CONTROLS CORPORATION BUFFALO, NEW YORK

Table 20

TOTAL AND AVERAGE DRILLING COSTS FOR
UNCASED WELLS IN SOFT ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TU} (given ϕ = 10 in.)	Y_{AVU} (given ϕ = 10 in.)
13254.09	13.25
16708.18	8.35
20162.28	6.72
23616.37	5.90
32200.62	6.44
41668.93	6.94
52021.30	7.43
63257.74	7.91
75378.24	8.38
88382.80	8.84

Y_{TU} (given ϕ = 11 in.)	Y_{AVU} (given ϕ = 11 in.)
13639.41	13.64
17478.82	8.74
21318.23	7.11
25779.87	6.44
34932.88	6.99
45019.06	7.50
56038.43	8.01
67990.96	8.50
80876.68	8.99
94695.58	9.47

Y_{TU} (given ϕ = 12 in.)	Y_{AVU} (given ϕ = 12 in.)
14046.64	14.05
18293.29	9.15
22539.93	7.51
28056.56	7.01
37806.63	7.56
48538.99	8.09
60253.65	8.61
72950.59	9.12
86629.83	9.63
101291.36	10.13

Y_{TU} (given ϕ = 13 in.)	Y_{AVU} (given ϕ = 13 in.)
14475.79	14.48
19151.58	9.58
23827.37	7.94
30446.46	7.61
40821.89	8.16
52228.73	8.70
64666.97	9.24
78136.62	9.77
92637.68	10.29
108170.14	10.82

Y_{TU} (given ϕ = 14 in.)	Y_{AVU} (given ϕ = 14 in.)
14926.85	14.93
20053.71	10.03
25180.56	8.39
32949.56	8.24
43978.65	8.80
56088.26	9.35
69278.40	9.90
83549.05	10.44
98900.22	10.99
115331.92	11.53

Y_{TU} (given ϕ = 15 in.)	Y_{AVU} (given ϕ = 15 in.)
15399.83	15.40
20999.67	10.50
26599.50	8.87
35565.86	8.89
47276.91	9.46
60117.60	10.02
74087.92	10.58
89187.88	11.15
105417.47	11.71
122776.70	12.28

Continued

Y_{TU} (given ϕ = 16 in.)	Y_{AVU} (given ϕ = 16 in.)
15894.73	15.89
21989.45	10.99
28084.18	9.36
38295.35	9.57
50716.67	10.14
64316.73	10.72
79095.54	11.30
95053.11	11.88
112189.42	12.47
130504.49	13.05

Y_{TU} (given ϕ = 17 in.)	Y_{AVU} (given ϕ = 17 in.)
16411.53	16.41
23023.07	11.51
29634.60	9.88
41138.05	10.28
54297.93	10.86
68685.67	11.45
84301.27	12.04
101144.74	12.64
119216.07	13.25
138515.27	13.85

Y_{TU} (given ϕ = 18 in.)	Y_{AVU} (given ϕ = 18 in.)
16950.26	16.95
24100.52	12.05
31444.20	10.48
44093.95	11.02
58020.69	11.60
73224.40	12.20
89705.10	12.82
107462.77	13.43
126497.42	14.06
146809.05	14.68

Y_{TU} (given ϕ = 19 in.)	Y_{AVU} (given ϕ = 19 in.)
17510.90	17.51
25221.80	12.61
33767.25	11.26
47163.05	11.79
61884.95	12.38
77932.94	12.99
95307.02	13.62
114007.20	14.25
134033.47	14.89
155385.84	15.54

Y_{TU} (given ϕ = 20 in.)	Y_{AVU} (given ϕ = 20 in.)
18093.45	18.09
26386.90	13.19
36175.20	12.06
50345.35	12.59
65890.71	13.18
82811.28	13.80
101107.05	14.44
120778.03	15.10
141824.23	15.76
164245.63	16.42

Y_{TU} (given ϕ = 21 in.)	Y_{AVU} (given ϕ = 21 in.)
18697.92	18.70
27595.84	13.80
38668.05	12.89
53640.85	13.41
70037.97	14.01
87859.41	14.64
107105.18	15.30
127775.27	15.97
149869.68	16.65
173388.41	17.34

Continued

Y_{TU} (given ϕ = 22 in.)	Y_{AVU} (given ϕ = 22 in.)
19324.31	19.32
28848.61	14.42
41245.81	13.75
57049.55	14.26
74326.73	14.87
93077.35	15.51
113301.41	16.19
134998.90	16.87
158169.83	17.57
182814.20	18.28

Y_{TU} (given ϕ = 23 in.)	Y_{AVU} (given ϕ = 23 in.)
19972.61	19.97
30145.21	15.07
43908.46	14.64
60571.45	15.14
78756.99	15.75
98465.09	16.41
119695.73	17.10
142448.93	17.81
166724.69	18.52
192522.99	19.25

Y_{TU} (given ϕ = 24 in.)	Y_{AVU} (given ϕ = 24 in.)
20642.82	20.64
31485.64	15.74
46656.01	15.55
64206.55	16.05
83328.76	16.67
104022.63	17.34
126288.16	18.04
150125.37	18.77
175534.24	19.50
202514.78	20.25

Y_{TU} (given ϕ = 25 in.)	Y_{AVU} (given ϕ = 25 in.)
21334.95	21.33
32869.90	16.43
49488.47	16.50
67954.85	16.99
88042.02	17.61
109749.97	18.29
133078.69	19.01
158028.21	19.75
184598.50	20.51
212789.57	21.28

Y_{TU} (given ϕ = 26 in.)	Y_{AVU} (given ϕ = 26 in.)
22049.00	22.05
34665.18	17.33
52405.82	17.47
71816.35	17.95
92896.78	18.58
115647.10	19.27
140067.32	20.01
166157.44	20.77
193917.45	21.55
223347.36	22.33

Y_{TU} (given ϕ = 27 in.)	Y_{AVU} (given ϕ = 27 in.)
22784.96	22.78
36744.11	18.37
55408.08	18.47
75791.05	18.95
97893.04	19.58
121714.04	20.29
147254.05	21.04
174513.08	21.81
203491.11	22.61
234188.15	23.42

Continued

Y_{TU} (given ϕ = 28 in.)	Y_{AVU} (given ϕ = 28 in.)
23542.83	23.54
38879.63	19.44
58495.23	19.50
79878.96	19.97
103030.81	20.61
127950.78	21.33
154638.89	22.09
183095.11	22.89
213319.46	23.70
245311.94	24.53

Y_{TU} (given ϕ = 29 in.)	Y_{AVU} (given ϕ = 29 in.)
24322.62	24.32
41071.75	20.54
61667.28	20.56
84080.06	21.02
108310.07	21.66
134357.32	22.39
162221.82	23.17
191903.55	23.99
223402.52	24.82
256718.73	25.67

Y_{TU} (given ϕ = 30 in.)	Y_{AVU} (given ϕ = 30 in.)
25124.33	25.12
43320.47	21.66
64924.24	21.64
88394.36	22.10
113730.84	22.75
140933.67	23.49
170002.85	24.29
200938.39	25.12
233740.28	25.97
268408.53	26.84

Y_{TU} (given ϕ = 31 in.)	Y_{AVU} (given ϕ = 31 in.)
25947.95	25.95
45625.79	22.81
68266.10	22.76
92821.86	23.21
119293.10	23.86
147679.81	24.61
177981.98	25.43
210199.63	26.27
244332.74	27.15
280381.32	28.04

Y_{TU} (given ϕ = 32 in.)	Y_{AVU} (given ϕ = 32 in.)
26793.49	26.79
47987.72	23.99
71692.85	23.90
97362.57	24.34
124996.87	25.00
154595.75	25.77
186159.22	26.59
219687.27	27.46
255179.90	28.35
292637.12	29.26

Y_{TU} (given ϕ = 33 in.)	Y_{AVU} (given ϕ = 33 in.)
27660.94	27.66
50406.24	25.20
75204.50	25.07
102016.47	25.50
130842.13	26.17
161681.49	26.95
194534.55	27.79
229401.31	28.68
266281.76	29.59
305175.91	30.52

Continued

Y_{TU} (given ϕ = 34 in.)	Y_{AVU} (given ϕ = 34 in.)
29024.47	29.02
52881.36	26.44
78801.06	26.27
106783.57	26.70
136828.90	27.37
168937.04	28.16
203107.98	29.02
239341.75	29.92
277638.32	30.85
317997.71	31.80

Y_{TU} (given ϕ = 35 in.)	Y_{AVU} (given ϕ = 35 in.)
30455.58	30.46
55413.08	27.71
82482.52	27.49
111663.88	27.92
142957.16	28.59
176362.38	29.39
211879.52	30.27
249508.59	31.19
289249.58	32.14
331102.50	33.11

Y_{TU} (given ϕ = 36 in.)	Y_{AVU} (given ϕ = 36 in.)
31914.98	31.91
58001.41	29.00
86248.87	28.75
116657.38	29.16
149226.93	29.85
183957.52	30.66
220849.16	31.55
259901.83	32.49
301115.55	33.46
344490.30	34.45

Y_{TU} (given ϕ = 37 in.)	T_{AVU} (given ϕ = 37 in.)
33402.69	33.40
60646.33	30.32
90100.13	30.03
121764.09	30.44
155638.20	31.13
191722.47	31.95
230016.89	32.86
270521.47	33.82
313236.21	34.80
358161.11	35.82

Y_{TU} (given ϕ = 38 in.)	T_{AVU} (given ϕ = 38 in.)
34918.69	34.92
63347.85	31.67
94036.29	31.35
126983.99	31.75
162190.96	32.44
199657.21	33.28
239382.72	34.20
281367.51	35.17
325611.57	36.18
372114.89	37.21

Y_{TU} (given ϕ = 39 in.)	T_{AVU} (given ϕ = 39 in.)
36463.00	36.46
66105.98	33.05
98057.34	32.69
132317.09	33.08
168885.23	33.78
207761.75	34.63
248946.66	35.56
292439.96	36.55
338241.63	37.58
386351.71	38.64

Continued

Y_{TU} (given ϕ = 40 in.)	Y_{AVU} (given ϕ = 40 in.)
38035.60	38.04
68920.70	34.46
102163.30	34.05
137763.40	34.44
175721.00	35.14
216036.10	36.01
258708.70	36.96
303738.80	37.97
351126.40	39.01
400871.50	40.09

Y_{TU} (given ϕ = 41 in.)	Y_{AVU} (given ϕ = 41 in.)
39636.51	39.64
71792.02	35.90
106354.16	35.45
143322.91	35.83
182698.27	36.54
224480.25	37.41
268668.84	38.38
315264.04	39.41
364265.87	40.47
415225.71	41.52

Y_{TU} (given ϕ = 42 in.)	Y_{AVU} (given ϕ = 42 in.)
41265.71	41.27
74719.95	37.36
110629.92	36.88
148995.61	37.25
189817.04	37.96
233094.19	38.85
278827.08	39.83
327015.69	40.88
377660.03	41.96
428328.33	42.83

Y_{TU} (given ϕ = 43 in.)	Y_{AVU} (given ϕ = 43 in.)
42923.21	42.92
77704.47	38.85
114990.57	38.33
154781.52	38.70
197077.31	39.42
241877.94	40.31
289183.42	41.31
338993.73	42.37
391308.90	43.48
441650.08	44.17

Y_{TU} (given ϕ = 44 in.)	Y_{AVU} (given ϕ = 44 in.)
44609.02	44.61
80745.60	40.37
119436.13	39.81
160680.62	40.17
204479.08	40.90
250831.49	41.81
299737.86	42.82
351198.18	43.90
405212.47	45.02
455191.00	45.52

Y_{TU} (given ϕ = 45 in.)	Y_{AVU} (given ϕ = 45 in.)
46323.12	46.32
83843.32	41.92
123966.59	41.32
166692.93	41.67
212022.35	42.40
259954.83	43.33
310490.39	44.36
363629.03	45.45
419370.73	46.60
468951.06	46.90

Table 21

TOTAL AND AVERAGE DRILLING COSTS FOR UNCASED WELLS IN MEDIUM SOFT ROCK AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TU} (given ϕ = 10 in.)	Y_{AVU} (given ϕ = 10 in.)
14162.60	14.16
18525.21	9.26
22887.81	7.63
27250.42	6.81
37479.90	7.50
48888.13	8.15
61475.11	8.78
75240.84	9.41
90185.32	10.02
106308.55	10.63

Y_{TU} (given ϕ = 11 in.)	Y_{AVU} (given ϕ = 11 in.)
14619.98	14.62
19439.96	9.72
24259.94	8.09
29783.03	7.45
40714.47	8.14
52890.16	8.82
66310.07	9.47
80974.23	10.12
96882.62	10.76
114035.25	11.40

Y_{TU} (given ϕ = 12 in.)	Y_{AVU} (given ϕ = 12 in.)
15102.07	15.10
20404.14	10.20
25706.20	8.57
32448.53	8.11
44115.16	8.82
57091.52	9.52
71377.60	10.20
86973.41	10.87
103878.93	11.54
122094.18	12.21

Y_{TU} (given ϕ = 13 in.)	Y_{AVU} (given ϕ = 13 in.)
15608.86	15.61
21417.73	10.71
27226.59	9.08
35246.92	8.81
47681.97	9.54
61492.23	10.25
76677.70	10.95
93238.38	11.65
111174.26	12.35
130485.35	13.05

Y_{TU} (given ϕ = 14 in.)	Y_{AVU} (given ϕ = 14 in.)
16140.37	16.14
22480.74	11.24
28821.12	9.61
38178.21	9.54
51414.90	10.28
66092.28	11.02
82210.36	11.74
99769.13	12.47
118768.60	13.20
139208.76	13.92

Y_{TU} (given ϕ = 15 in.)	Y_{AVU} (given ϕ = 15 in.)
16696.59	16.70
23593.18	11.80
30489.77	10.16
41242.39	10.31
55313.94	11.06
70891.68	11.82
87975.59	12.57
106565.68	13.32
126661.95	14.07
148264.40	14.83

Continued

Y_{TU} (given ϕ = 16 in.)	Y_{AVU} (given ϕ = 16 in.)
17277.52	17.28
24755.04	12.38
32232.55	10.74
44439.47	11.11
59379.11	11.88
75890.41	12.65
93973.38	13.42
113628.01	14.20
134854.31	14.98
157652.28	15.77

Y_{TU} (given ϕ = 17 in.)	Y_{AVU} (given ϕ = 17 in.)
17883.16	17.88
25966.31	12.98
34049.47	11.35
47769.45	11.94
63610.39	12.72
81088.49	13.51
100203.74	14.31
120956.14	15.12
143345.69	15.93
167372.40	16.74

Y_{TU} (given ϕ = 18 in.)	Y_{AVU} (given ϕ = 18 in.)
18513.51	18.51
27227.01	13.61
36159.48	12.05
51232.31	12.81
68007.79	13.60
86485.90	14.41
106666.66	15.24
128550.05	16.07
152136.08	16.90
177424.75	17.74

Y_{TU} (given ϕ = 19 in.)	Y_{AVU} (given ϕ = 19 in.)
19168.57	19.17
28537.13	14.27
38852.97	12.95
54828.08	13.71
72571.31	14.51
92082.66	15.35
113362.14	16.19
136409.75	17.05
161225.48	17.91
187809.34	18.78

Y_{TU} (given ϕ = 20 in.)	Y_{AVU} (given ϕ = 20 in.)
19848.34	19.85
29896.67	14.95
41646.13	13.88
58556.73	14.64
77300.94	15.46
97878.76	16.31
120290.20	17.18
144535.24	18.07
170613.90	18.96
198526.16	19.85

Y_{TU} (given ϕ = 21 in.)	Y_{AVU} (given ϕ = 21 in.)
20552.82	20.55
31305.63	15.65
44538.97	14.85
62418.28	15.60
82196.70	16.44
103874.21	17.31
127450.82	18.21
152926.52	19.12
180301.33	20.03
209575.23	20.96

Continued

Y_{TU} (given ϕ = 22 in.)	Y_{AVU} (given ϕ = 22 in.)
21282.01	21.28
32764.01	16.38
47531.47	15.84
66412.73	16.60
87258.57	17.45
110068.99	18.34
134844.00	19.26
161583.59	20.20
190287.77	21.14
220956.52	22.10

Y_{TU} (given ϕ = 23 in.)	Y_{AVU} (given ϕ = 23 in.)
22035.91	22.04
34271.82	17.14
50623.65	16.87
70540.07	17.64
92486.56	18.50
116463.12	19.41
142469.75	20.35
170506.45	21.31
200573.22	22.29
232670.06	23.27

Y_{TU} (given ϕ = 24 in.)	Y_{AVU} (given ϕ = 24 in.)
22814.52	22.81
35829.04	17.91
53815.49	17.94
74800.30	18.70
97880.67	19.58
123056.59	20.51
150328.06	21.48
179695.10	22.46
211157.68	23.46
244715.83	24.47

Y_{TU} (given ϕ = 25 in.)	Y_{AVU} (given ϕ = 25 in.)
23617.84	23.62
37435.68	18.72
57107.01	19.04
79193.43	19.80
103440.89	20.69
129849.40	21.64
158418.94	22.63
189149.53	23.64
222041.16	24.67
257093.83	25.71

Y_{TU} (given ϕ = 26 in.)	Y_{AVU} (given ϕ = 26 in.)
24445.87	24.45
39503.47	19.75
60498.20	20.17
83719.46	20.93
109167.24	21.83
136841.55	22.81
166742.39	23.82
198869.75	24.86
233223.65	25.91
269804.07	26.98

Y_{TU} (given ϕ = 27 in.)	Y_{AVU} (given ϕ = 27 in.)
25298.62	25.30
41891.76	20.95
63989.06	21.33
88378.37	22.09
115059.70	23.01
144033.04	24.01
175298.40	25.04
208855.77	26.11
244705.16	27.19
282846.55	28.28

Continued

Y_{TU} (given ϕ = 28 in.)	Y_{AVU} (given ϕ = 28 in.)
26176.07	26.18
44346.49	22.17
67579.59	22.53
93170.19	23.29
121118.28	24.22
151423.88	25.24
184086.97	26.30
219107.57	27.39
256485.67	28.50
296221.27	29.62

Y_{TU} (given ϕ = 29 in.)	Y_{AVU} (given ϕ = 29 in.)
27078.24	27.08
46867.67	23.43
71269.79	23.76
98094.89	24.52
127342.98	25.47
159014.05	26.50
193108.12	27.59
229625.16	28.70
268565.20	29.84
309928.21	30.99

Y_{TU} (given ϕ = 30 in.)	Y_{AVU} (given ϕ = 30 in.)
28005.11	28.01
49455.30	24.73
75059.66	25.02
103152.49	25.79
133733.80	26.75
166803.57	27.80
202361.82	28.91
240408.54	30.05
280943.74	31.22
323967.40	32.40

Y_{TU} (given ϕ = 31 in.)	Y_{AVU} (given ϕ = 31 in.)
28956.69	28.96
52109.38	26.05
78949.21	26.32
108342.99	27.09
140290.73	28.06
174792.44	29.13
211848.10	30.26
251457.72	31.43
293621.29	32.62
338338.82	33.83

Y_{TU} (given ϕ = 32 in.)	Y_{AVU} (given ϕ = 32 in.)
29932.99	29.93
54829.90	27.41
82938.42	27.65
113666.38	28.42
147013.79	29.40
182980.64	30.50
221566.93	31.65
262772.67	32.85
306597.86	34.07
353042.48	35.30

Y_{TU} (given ϕ = 33 in.)	Y_{AVU} (given ϕ = 33 in.)
30934.00	30.93
57616.87	28.81
87027.30	29.01
119122.67	29.78
153902.96	30.78
191368.18	31.89
231518.33	33.07
274353.42	34.29
319873.43	35.54
368078.38	36.81

Continued

Y_{TU} (given ϕ = 34 in.)	Y_{AVU} (given ϕ = 34 in.)
32475.14	32.48
60470.29	30.24
91215.86	30.41
124711.84	31.18
160958.25	32.19
199955.07	33.33
241702.30	34.53
286199.96	35.77
333448.02	37.05
383446.51	38.34

Y_{TU} (given ϕ = 35 in.)	Y_{AVU} (given ϕ = 35 in.)
34092.13	34.09
63390.15	31.70
95504.08	31.83
130433.92	32.61
168179.65	33.64
208741.29	34.79
252118.83	36.02
298312.28	37.29
347321.63	38.59
399146.88	39.91

Y_{TU} (given ϕ = 36 in.)	Y_{AVU} (given ϕ = 36 in.)
35742.34	35.74
66376.47	33.19
99891.98	33.30
136288.89	34.07
175567.18	35.11
217726.87	36.29
262767.94	37.54
310690.39	38.84
361494.25	40.17
415179.48	41.52

Y_{TU} (given ϕ = 37 in.)	T_{AVU} (given ϕ = 37 in.)
37425.78	37.43
69429.23	34.71
104379.55	34.79
142276.75	35.57
183120.83	36.62
226911.78	37.82
273649.60	39.09
323334.30	40.42
375965.88	41.77
431544.33	43.15

Y_{TU} (given ϕ = 38 in.)	T_{AVU} (given ϕ = 38 in.)
39142.43	39.14
72548.43	36.27
108966.79	36.32
148397.51	37.10
190840.59	38.17
236296.03	39.38
284763.83	40.68
336243.99	42.03
390736.52	43.42
448241.39	44.82

Y_{TU} (given ϕ = 39 in.)	T_{AVU} (given ϕ = 39 in.)
40892.32	40.89
75734.08	37.87
113653.70	37.88
154651.16	38.66
198726.47	39.75
245879.62	40.98
296110.63	42.30
349419.47	43.68
405806.17	45.09
465270.71	46.53

Continued

Y_{TU} (given ϕ = 40 in.)	Y_{AVU} (given ϕ = 40 in.)
42675.43	42.68
78986.19	39.49
118440.28	39.48
161037.70	40.26
206778.47	41.36
255662.56	42.61
307689.99	43.96
362860.75	45.36
421174.84	46.80
482632.26	48.26

Y_{TU} (given ϕ = 41 in.)	Y_{AVU} (given ϕ = 41 in.)
44491.76	44.49
82304.73	41.15
123326.53	41.11
167557.15	41.89
214996.58	43.00
265644.84	44.27
319501.91	45.64
376567.80	47.07
436842.51	48.54
499757.12	49.98

Y_{TU} (given ϕ = 42 in.)	Y_{AVU} (given ϕ = 42 in.)
46341.31	46.34
85689.73	42.84
128312.45	42.77
174209.48	43.55
223380.82	44.68
275826.46	45.97
331546.40	47.36
390540.65	48.82
452809.21	50.31
515265.43	51.53

Y_{TU} (given ϕ = 43 in.)	Y_{AVU} (given ϕ = 43 in.)
48224.09	48.22
89141.17	44.57
133398.05	44.47
180994.71	45.25
231931.17	46.39
286207.42	47.70
343823.46	49.12
404779.29	50.60
469074.91	52.12
531020.83	53.10

Y_{TU} (given ϕ = 44 in.)	Y_{AVU} (given ϕ = 44 in.)
50140.09	50.14
92659.06	46.33
138583.31	46.19
187912.83	46.98
240647.64	48.13
296787.72	49.46
356333.08	50.90
419283.72	52.41
485639.63	53.96
547023.33	54.70

Y_{TU} (given ϕ = 45 in.)	Y_{AVU} (given ϕ = 45 in.)
52089.32	52.09
96243.40	48.12
143868.25	47.96
194963.85	48.74
249530.23	49.91
307567.37	51.26
369075.26	52.73
434053.93	54.26
502503.36	55.83
563272.95	56.33

Table 22

TOTAL AND AVERAGE DRILLING COSTS FOR UNCASED WELLS IN MEDIUM HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER (in dollars)

Y_{TU} (given ϕ = 10 in.)	Y_{AVU} (given ϕ = 10 in.)	Y_{TU} (given ϕ = 11 in.)	Y_{AVU} (given ϕ = 11 in.)	Y_{TU} (given ϕ = 12 in.)	Y_{AVU} (given ϕ = 12 in.)
15238.24	15.24	15776.96	15.78	16343.18	16.34
20676.47	10.34	21753.91	10.88	22886.36	11.44
26114.71	8.70	27730.87	9.24	29429.54	9.81
31552.95	7.89	34509.38	8.63	37620.26	9.41
43754.93	8.75	47569.12	9.51	51576.35	10.32
57494.42	9.58	62251.77	10.38	67240.78	11.21
72771.41	10.40	78557.35	11.22	84613.55	12.09
89585.89	11.20	96485.83	12.06	103694.65	12.96
107937.88	11.99	116037.23	12.89	124484.08	13.83
127827.37	12.78	137211.56	13.72	146981.84	14.70

Y_{TU} (given ϕ = 13 in.)	Y_{AVU} (given ϕ = 13 in.)	Y_{TU} (given ϕ = 14 in.)	Y_{AVU} (given ϕ = 14 in.)	Y_{TU} (given ϕ = 15 in.)	Y_{AVU} (given ϕ = 15 in.)
16936.91	16.94	17558.15	17.56	18206.89	18.21
24073.82	12.04	25316.29	12.66	26613.78	13.31
31210.73	10.40	33074.44	11.02	35020.67	11.67
40885.57	10.22	44305.32	11.08	47879.51	11.97
55776.64	11.16	60169.97	12.03	64756.35	12.95
72461.46	12.08	77913.78	12.99	83597.77	13.93
90940.02	12.99	97536.76	13.93	104403.77	14.91
111212.34	13.90	119038.91	14.88	127174.36	15.90
133278.41	14.81	142420.22	15.82	151909.53	16.88
157138.22	15.71	167680.71	16.77	178609.28	17.86

Continued

Y_{TU} (given ϕ = 16 in.)	Y_{AVU} (given ϕ = 16 in.)
18883.14	18.88
27966.27	13.98
37049.41	12.35
51608.15	12.90
69535.78	13.91
89513.42	14.92
111541.05	15.93
135618.69	16.95
161746.33	17.97
189923.96	18.99

Y_{TU} (given ϕ = 17 in.)	Y_{AVU} (given ϕ = 17 in.)
19586.89	19.59
29373.78	14.69
39160.67	13.05
55491.22	13.87
74508.26	14.90
95660.73	15.94
118948.61	16.99
144371.90	18.05
171930.62	19.10
201624.74	20.16

Y_{TU} (given ϕ = 18 in.)	Y_{AVU} (given ϕ = 18 in.)
20318.15	20.32
30836.30	15.42
41604.50	13.87
59528.73	14.88
79673.79	15.93
102039.69	17.01
126626.42	18.09
153433.99	19.18
182462.39	20.27
213711.62	21.37

Y_{TU} (given ϕ = 19 in.)	Y_{AVU} (given ϕ = 19 in.)
21076.91	21.08
32353.83	16.18
44715.23	14.91
63720.68	15.93
85032.37	17.01
108650.31	18.11
134574.51	19.22
162804.95	20.35
193341.64	21.48
226184.59	22.62

Y_{TU} (given ϕ = 20 in.)	Y_{AVU} (given ϕ = 20 in.)
21863.18	21.86
33926.37	16.96
47941.80	15.98
68067.07	17.02
90584.00	18.12
115492.60	19.25
142792.87	20.40
172484.80	21.56
204568.40	22.73
239043.66	23.90

Y_{TU} (given ϕ = 21 in.)	Y_{AVU} (given ϕ = 21 in.)
22676.96	22.68
35553.92	17.78
51284.20	17.09
72567.90	18.14
96328.68	19.27
122566.54	20.43
151281.49	21.61
182473.52	22.81
216142.64	24.02
252288.84	25.23

Continued

Y_{TU} (given ϕ = 22 in.)	Y_{AVU} (given ϕ = 22 in.)
23518.24	23.52
37236.48	18.62
54742.42	18.25
77223.16	19.31
102266.40	20.45
129872.14	21.65
160040.39	22.86
192771.12	24.10
228064.37	25.34
265920.11	26.59

Y_{TU} (given ϕ = 23 in.)	Y_{AVU} (given ϕ = 23 in.)
24387.03	24.39
38974.06	19.49
58316.48	19.44
82032.87	20.51
108397.18	21.68
137409.40	22.90
169069.54	24.15
203377.61	25.42
240333.58	26.70
279937.48	27.99

Y_{TU} (given ϕ = 24 in.)	Y_{AVU} (given ϕ = 24 in.)
25283.32	25.28
40766.64	20.38
62006.36	20.67
86997.02	21.75
114721.00	22.94
145178.32	24.20
178368.98	25.48
214292.96	26.79
252950.29	28.11
294340.94	29.43

Y_{TU} (given ϕ = 25 in.)	Y_{AVU} (given ϕ = 25 in.)
26207.12	26.21
42614.24	21.31
65812.08	21.94
92115.60	23.03
121237.88	24.25
153178.90	25.53
187938.68	26.85
225517.21	28.19
265914.48	29.55
309130.50	30.91

Y_{TU} (given ϕ = 26 in.)	Y_{AVU} (given ϕ = 26 in.)
27158.42	27.16
44982.78	22.49
69733.62	23.24
97388.63	24.35
127947.80	25.59
161411.14	26.90
197778.65	28.25
237050.32	29.63
279226.16	31.03
324306.17	32.43

Y_{TU} (given ϕ = 27 in.)	Y_{AVU} (given ϕ = 27 in.)
28137.23	28.14
47715.48	23.86
73770.99	24.59
102816.09	25.70
134850.77	26.97
169875.04	28.31
207888.89	29.70
248892.32	31.11
292885.34	32.54
339867.93	33.99

Continued

Y_{TU} (given ϕ = 28 in.)	Y_{AVU} (given ϕ = 28 in.)
29143.55	29.14
50525.40	25.26
77924.20	25.97
108398.00	27.10
141946.80	28.39
178570.59	29.76
218269.40	31.18
261043.19	32.63
306892.00	34.10
355815.79	35.58

Y_{TU} (given ϕ = 29 in.)	Y_{AVU} (given ϕ = 29 in.)
30177.37	30.18
53412.54	26.71
82193.23	27.40
114134.34	28.53
149235.86	29.85
187497.81	31.25
228920.17	32.70
273502.95	34.19
321246.14	35.69
372149.74	37.21

Y_{TU} (given ϕ = 30 in.)	Y_{AVU} (given ϕ = 30 in.)
31238.70	31.24
56376.89	28.19
86578.09	28.86
120025.12	30.01
156717.99	31.34
196656.68	32.78
239841.21	34.26
286271.58	35.78
335947.78	37.33
388869.81	38.89

Y_{TU} (given ϕ = 31 in.)	Y_{AVU} (given ϕ = 31 in.)
32327.53	32.33
59418.47	29.71
91078.78	30.36
126070.34	31.52
164393.16	32.88
206047.22	34.34
251032.53	35.86
299349.09	37.42
350996.91	39.00
405975.96	40.60

Y_{TU} (given ϕ = 32 in.)	Y_{AVU} (given ϕ = 32 in.)
33443.87	33.44
62537.27	31.27
95695.30	31.90
132270.01	33.07
172261.38	34.45
215669.41	35.94
262494.11	37.50
312735.48	39.09
366393.51	40.71
423468.22	42.35

Y_{TU} (given ϕ = 33 in.)	Y_{AVU} (given ϕ = 33 in.)
34587.71	34.59
65733.29	32.87
100427.66	33.48
138624.11	34.66
180322.64	36.06
225523.26	37.59
274225.97	39.18
326430.75	40.80
382137.62	42.46
441346.58	44.13

Continued

Y_{TU} (given ϕ = 34 in.)	Y_{AVU} (given ϕ = 34 in.)
36324.71	36.32
69006.52	34.50
105275.84	35.09
145132.65	36.28
188576.96	37.72
235608.77	39.27
286228.09	40.89
340434.90	42.55
398229.21	44.25
459611.02	45.96

Y_{TU} (given ϕ = 35 in.)	Y_{AVU} (given ϕ = 35 in.)
38147.03	38.15
72356.98	36.18
110239.85	36.75
151795.63	37.95
197024.33	39.40
245925.94	40.99
298500.47	42.64
354747.93	44.34
414668.29	46.07
478261.57	47.83

Y_{TU} (given ϕ = 36 in.)	Y_{AVU} (given ϕ = 36 in.)
40007.96	40.01
75784.66	37.89
115319.69	38.44
158613.05	39.65
205664.74	41.13
256474.77	42.75
311043.13	44.43
369369.83	46.17
431454.86	47.94
497298.22	49.73

Y_{TU} (given ϕ = 37 in.)	T_{AVU} (given ϕ = 37 in.)
41907.50	41.91
79289.55	39.64
120515.36	40.17
165584.91	41.40
214498.21	42.90
267255.26	44.54
323856.07	46.27
384300.62	48.04
448588.92	49.84
516720.97	51.67

Y_{TU} (given ϕ = 38 in.)	T_{AVU} (given ϕ = 38 in.)
43845.65	43.85
82871.67	41.44
125826.85	41.94
172711.20	43.18
223524.72	44.70
278267.40	46.38
336939.26	48.13
399540.28	49.94
466070.45	51.79
536529.81	53.65

Y_{TU} (given ϕ = 39 in.)	T_{AVU} (given ϕ = 39 in.)
45822.41	45.82
86531.00	43.27
131254.18	43.75
179991.94	45.00
232744.29	46.55
289511.21	48.25
350292.73	50.04
415088.82	51.89
483899.49	53.77
556724.75	55.67

Continued

Y_{TU} (given ϕ = 40 in.)	Y_{AVU} (given ϕ = 40 in.)
47837.78	47.84
90267.56	45.13
136797.34	45.60
187427.12	46.86
242156.90	48.43
300986.68	50.16
363916.46	51.99
430946.24	53.87
502076.02	55.79
577305.79	57.73

Y_{TU} (given ϕ = 41 in.)	Y_{AVU} (given ϕ = 41 in.)
49891.76	49.89
94081.33	47.04
142456.33	47.49
195016.73	48.75
251762.56	50.35
312693.81	52.12
377810.46	53.97
447112.54	55.89
520600.03	57.84
597557.52	59.76

Y_{TU} (given ϕ = 42 in.)	Y_{AVU} (given ϕ = 42 in.)
51984.35	51.98
97972.33	48.99
148231.14	49.41
202760.79	50.69
261561.27	52.31
324632.59	54.11
391974.74	56.00
463587.72	57.95
539471.53	59.94
615742.31	61.57

Y_{TU} (given ϕ = 43 in.)	Y_{AVU} (given ϕ = 43 in.)
54115.55	54.12
101940.54	50.97
154121.79	51.37
210659.28	52.66
271553.03	54.31
336803.03	56.13
406409.28	58.06
480371.77	60.05
558690.52	62.08
634202.15	63.42

Y_{TU} (given ϕ = 44 in.)	Y_{AVU} (given ϕ = 44 in.)
56285.35	56.29
105985.98	52.99
160128.26	53.38
218712.22	54.68
281737.84	56.35
349205.13	58.20
421114.09	60.16
497464.70	62.18
578256.99	64.25
652937.05	65.29

Y_{TU} (given ϕ = 45 in.)	Y_{AVU} (given ϕ = 45 in.)
58493.77	58.49
110108.63	55.05
166250.57	55.42
226919.59	56.73
292115.70	58.42
361838.89	60.31
436089.16	62.30
514866.52	64.36
598170.95	66.46
671947.00	67.19

Table 23

TOTAL AND AVERAGE DRILLING COSTS FOR
UNCASED WELLS IN HARD ROCK
AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TU} (given ϕ = 10 in.)	Y_{AVU} (given ϕ = 10 in.)
18603.05	18.60
27406.09	13.70
36209.14	12.07
45012.19	11.25
63535.71	12.71
84779.43	14.13
108743.34	15.53
135427.45	16.93
164831.74	18.31
196956.23	19.70

Y_{TU} (given ϕ = 11 in.)	Y_{AVU} (given ϕ = 11 in.)
19371.87	19.37
28943.74	14.47
38515.61	12.84
49213.62	12.30
69070.42	13.81
91798.52	15.30
117397.94	16.77
145868.67	18.23
177210.72	19.69
211424.08	21.14

Y_{TU} (given ϕ = 12 in.)	Y_{AVU} (given ϕ = 12 in.)
20173.79	20.17
30547.58	15.27
40921.37	13.64
53626.03	13.41
74868.83	14.97
99134.06	16.52
126421.73	18.06
156731.83	19.59
190064.37	21.12
226419.35	22.64

Y_{TU} (given ϕ = 13 in.)	Y_{AVU} (given ϕ = 13 in.)
21008.81	21.01
32217.61	16.11
43426.42	14.48
58249.40	14.56
80930.95	16.19
106786.05	17.80
135814.71	19.40
168016.93	21.00
203392.71	22.60
241942.04	24.19

Y_{TU} (given ϕ = 14 in.)	Y_{AVU} (given ϕ = 14 in.)
21876.92	21.88
33953.84	16.98
46030.76	15.34
63083.75	15.77
87256.78	17.45
114754.49	19.13
145576.89	20.80
179723.96	22.47
217195.72	24.13
257992.15	25.80

Y_{TU} (given ϕ = 15 in.)	Y_{AVU} (given ϕ = 15 in.)
2778.13	22.78
35756.26	17.88
48734.39	16.24
68129.06	17.03
93846.32	18.77
123039.39	20.51
155708.26	22.24
191852.93	23.98
231473.41	25.72
274569.68	27.46

Continued

Y_{TU} (given ϕ = 16 in.)	Y_{AVU} (given ϕ = 16 in.)
23712.43	23.71
37624.87	18.81
51537.30	17.18
73385.33	18.35
100699.57	20.14
131640.74	21.94
166208.82	23.74
204403.84	25.55
246225.77	27.36
291674.62	29.17

Y_{TU} (given ϕ = 17 in.)	Y_{AVU} (given ϕ = 17 in.)
24679.83	24.68
39559.67	19.78
54439.50	18.15
78852.58	19.71
107816.54	21.56
140558.54	23.43
177078.59	25.30
217376.68	27.17
261452.82	29.05
309307.00	30.93

Y_{TU} (given ϕ = 18 in.)	Y_{AVU} (given ϕ = 18 in.)
25680.33	25.68
41560.66	20.78
57793.55	19.26
84530.79	21.13
115197.21	23.04
149792.79	24.97
188317.54	26.90
230771.45	28.85
277154.53	30.79
327466.78	32.75

Y_{TU} (given ϕ = 19 in.)	Y_{AVU} (given ϕ = 19 in.)
26713.93	26.71
43627.85	21.81
62078.65	20.69
90419.98	22.60
122841.59	24.57
159343.50	26.56
199925.69	28.56
244588.17	30.57
293330.93	32.59
346153.99	34.62

Y_{TU} (given ϕ = 20 in.)	Y_{AVU} (given ϕ = 20 in.)
27780.61	27.78
45761.23	22.88
66521.98	22.17
96520.13	24.13
130749.68	26.15
169210.65	28.20
211903.03	30.27
258826.82	32.35
309982.02	34.44
365368.62	36.54

Y_{TU} (given ϕ = 21 in.)	Y_{AVU} (given ϕ = 21 in.)
28880.40	28.88
47960.80	23.98
71123.54	23.71
102831.25	25.71
138921.49	27.78
179394.26	29.90
224249.57	32.04
273487.41	34.19
327107.78	36.35
385110.67	38.51

Continued

Y_{TU} (given ϕ = 22 in.)	Y_{AVU} (given ϕ = 22 in.)
30013.28	30.01
50226.57	25.11
75883.32	25.29
109353.33	27.34
147357.00	29.47
189894.32	31.65
236965.30	33.85
288569.92	36.07
344708.21	38.30
405380.14	40.54

Y_{TU} (given ϕ = 23 in.)	Y_{AVU} (given ϕ = 23 in.)
31179.26	31.18
52558.52	26.28
80801.33	26.93
116086.39	29.02
156056.22	31.21
200710.83	33.45
250050.22	35.72
304074.39	38.01
362783.32	40.31
426177.04	42.62

Y_{TU} (given ϕ = 24 in.)	Y_{AVU} (given ϕ = 24 in.)
32378.34	32.38
54956.67	27.48
85877.56	28.63
123030.41	30.76
165019.16	33.00
211843.80	35.31
263504.34	37.64
320000.77	40.00
381333.11	42.37
447501.35	44.75

Y_{TU} (given ϕ = 25 in.)	Y_{AVU} (given ϕ = 25 in.)
33610.51	33.61
57421.01	28.71
91112.02	30.37
130185.40	32.55
174245.80	34.85
223293.22	37.22
277327.65	39.62
336349.11	42.04
400357.59	44.48
469353.08	46.94

Y_{TU} (given ϕ = 26 in.)	Y_{AVU} (given ϕ = 26 in.)
34875.77	34.88
60596.20	30.30
96504.71	32.17
137551.36	34.39
183736.15	36.75
235059.08	39.18
291520.16	41.65
353119.37	44.14
419856.73	46.65
491732.23	49.17

Y_{TU} (given ϕ = 27 in.)	Y_{AVU} (given ϕ = 27 in.)
36174.14	36.17
64272.22	32.14
102055.62	34.02
145128.29	36.28
193490.21	38.70
247141.41	41.19
306081.86	43.73
370311.58	46.29
439830.56	48.87
514638.80	51.46

Continued

Y_{TU} (given ϕ = 28 in.)	Y_{AVU} (given ϕ = 28 in.)
37505.60	37.51
68053.72	34.03
107764.76	35.92
152916.18	38.23
203507.99	40.70
259540.18	43.26
321012.75	45.86
387925.71	48.49
460279.06	51.14
538072.79	53.81

Y_{TU} (given ϕ = 29 in.)	Y_{AVU} (given ϕ = 29 in.)
38870.15	38.87
71940.71	35.97
113632.12	37.88
160915.04	40.23
213789.47	42.76
272255.40	45.38
336312.84	48.04
405961.79	50.75
481202.24	53.47
562034.20	56.20

Y_{TU} (given ϕ = 30 in.)	Y_{AVU} (given ϕ = 30 in.)
40267.80	40.27
75933.18	37.97
119657.71	39.89
169124.87	42.28
224334.66	44.87
285287.08	47.55
351982.13	50.28
424419.81	53.05
502600.11	55.84
586523.04	58.65

Y_{TU} (given ϕ = 31 in.)	Y_{AVU} (given ϕ = 31 in.)
41698.55	41.70
80031.14	40.02
125841.53	41.95
177545.67	44.39
235143.57	47.03
298635.22	49.77
368020.61	52.57
443299.75	55.41
524472.65	58.27
611539.28	61.15

Y_{TU} (given ϕ = 32 in.)	Y_{AVU} (given ϕ = 32 in.)
43162.39	43.16
84234.58	42.12
132183.57	44.06
186177.44	46.54
246216.18	49.24
312299.79	52.05
384428.28	54.92
462601.63	57.83
546819.85	60.76
637082.95	63.71

Y_{TU} (given ϕ = 33 in.)	Y_{AVU} (given ϕ = 33 in.)
44659.33	44.66
88543.50	44.27
138683.84	46.23
195020.18	48.76
257552.50	51.51
326280.83	54.38
401205.14	57.32
482325.45	60.29
569641.75	63.29
663154.05	66.32

Continued

Y_{TU} (given ϕ = 34 in.)	Y_{AVU} (given ϕ = 34 in.)
46920.60	46.92
92957.91	46.48
145342.34	48.45
204073.88	51.02
269152.54	53.83
340578.31	56.76
418351.19	59.76
502471.21	62.81
592938.33	65.88
689752.55	68.98

Y_{TU} (given ϕ = 35 in.)	Y_{AVU} (given ϕ = 35 in.)
49294.78	49.29
97477.80	48.74
152159.06	50.72
213338.55	53.33
281016.28	56.20
355192.25	59.20
435866.45	62.27
523038.90	65.38
616709.58	68.52
716878.48	71.69

Y_{TU} (given ϕ = 36 in.)	Y_{AVU} (given ϕ = 36 in.)
51721.71	51.72
102103.18	51.05
159134.00	53.04
222814.19	55.70
293143.73	58.63
370122.64	61.69
453750.90	64.82
544028.52	68.00
640955.51	71.22
744531.85	74.45

Y_{TU} (given ϕ = 37 in.)	T_{AVU} (given ϕ = 37 in.)
54201.38	54.20
106834.04	53.42
166267.18	55.42
232500.80	58.13
305534.90	61.11
385369.48	64.23
472004.55	67.43
565440.09	70.68
665676.12	73.96
772712.62	77.27

Y_{TU} (given ϕ = 38 in.)	T_{AVU} (given ϕ = 38 in.)
56733.79	56.73
111670.38	55.84
173558.58	57.85
242398.37	60.60
318189.77	63.64
400932.78	66.82
490627.37	70.09
587273.59	73.41
690871.39	76.76
801420.80	80.14

Y_{TU} (given ϕ = 39 in.)	T_{AVU} (given ϕ = 39 in.)
59318.94	59.32
116612.21	58.31
181008.20	60.34
252506.91	63.13
331108.35	66.22
416812.52	69.47
509619.41	72.80
609529.02	76.19
716541.36	79.62
830656.41	83.07

Continued

Y_{TU} (given ϕ = 40 in.)	Y_{AVU} (given ϕ = 40 in.)
61956.84	61.96
121659.52	60.83
188616.05	62.87
262826.42	65.71
344290.65	68.86
433008.72	72.17
528980.63	75.57
632206.40	79.03
742686.00	82.52
860419.44	86.04

Y_{TU} (given ϕ = 41 in.)	Y_{AVU} (given ϕ = 41 in.)
64647.48	64.65
126812.32	63.41
196382.13	65.46
273356.91	68.34
357736.65	71.55
449521.37	74.92
548711.05	78.39
655305.71	81.91
769305.32	85.48
889511.55	88.95

Y_{TU} (given ϕ = 42 in.)	Y_{AVU} (given ϕ = 42 in.)
67390.85	67.39
132070.60	66.04
204306.43	68.10
284098.36	71.02
371446.38	74.29
466350.47	77.73
568810.66	81.26
678826.95	84.85
796399.33	88.49
915015.71	91.50

Y_{TU} (given ϕ = 43 in.)	Y_{AVU} (given ϕ = 43 in.)
70186.98	70.19
137434.36	68.72
212388.96	70.80
295050.77	73.76
385419.79	77.08
483496.03	80.58
589279.48	84.18
702770.13	87.85
823968.00	91.55
940850.82	94.09

Y_{TU} (given ϕ = 44 in.)	Y_{AVU} (given ϕ = 44 in.)
73035.84	73.04
142903.61	71.45
220629.72	73.54
306214.15	76.55
399656.92	79.93
500958.03	83.49
610117.47	87.16
727135.25	90.89
852011.36	94.67
967016.88	96.70

Y_{TU} (given ϕ = 45 in.)	Y_{AVU} (given ϕ = 45 in.)
75937.44	75.94
148478.34	74.24
229028.70	76.34
317588.51	79.40
414157.77	82.83
518736.50	86.46
631324.66	90.19
751922.30	93.99
880529.38	97.84
993513.92	99.35

Table 24

TOTAL AND AVERAGE DRILLING COSTS FOR UNCASED WELLS IN VERY HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER (in dollars)

Y_{TU} (given ϕ = 10 in.)	Y_{AVU} (given ϕ = 10 in.)
21011.42	21.01
32222.84	16.11
43434.25	14.48
54645.67	13.66
77617.71	15.52
104126.01	17.35
134170.55	19.17
167751.34	20.97
204868.39	22.76
245521.68	24.55

Y_{TU} (given ϕ = 11 in.)	Y_{AVU} (given ϕ = 11 in.)
21957.21	21.96
34114.42	17.06
46271.63	15.42
59778.95	14.94
84430.56	16.89
112814.87	18.80
144931.90	20.70
180781.63	22.60
220364.07	24.48
263679.22	26.37

Y_{TU} (given ϕ = 12 in.)	Y_{AVU} (given ϕ = 12 in.)
22941.69	22.94
36083.38	18.04
49225.07	16.41
65169.13	16.29
91564.53	18.31
121889.10	20.31
156142.83	22.31
194325.73	24.29
236437.80	26.27
282479.04	28.25

Y_{TU} (given ϕ = 13 in.)	Y_{AVU} (given ϕ = 13 in.)
23964.86	23.96
38129.72	19.06
52294.57	17.43
70816.22	17.70
99019.64	19.80
131348.68	21.89
167803.35	23.97
208383.64	26.05
253089.56	28.12
301921.10	30.19

Y_{TU} (given ϕ = 14 in.)	Y_{AVU} (given ϕ = 14 in.)
25026.71	25.03
40253.42	20.13
55480.14	18.49
76720.21	19.18
106795.88	21.36
141193.62	23.53
179913.45	25.70
222955.36	27.87
270319.36	30.04
322005.44	32.20

Y_{TU} (given ϕ = 15 in.)	Y_{AVU} (given ϕ = 15 in.)
26127.25	26.13
42454.50	21.23
58781.76	19.59
82881.11	20.72
114893.24	22.98
151423.92	25.24
192473.13	27.50
238040.90	29.76
288127.19	32.01
342732.03	34.27

Continued

Y_{TU} (given ϕ = 16 in.)	Y_{AVU} (given ϕ = 16 in.)
27266.48	27.27
44732.96	22.37
62199.44	20.73
89298.92	22.32
123311.75	24.66
162039.58	27.01
205482.40	29.35
253640.23	31.71
306513.07	34.06
364100.89	36.41

Y_{TU} (given ϕ = 17 in.)	Y_{AVU} (given ϕ = 17 in.)
28444.39	28.44
47088.79	23.54
65733.18	21.91
95973.63	23.99
132051.38	26.41
173040.59	28.84
218941.26	31.28
269753.39	33.72
325476.97	36.16
386112.01	38.61

Y_{TU} (given ϕ = 18 in.)	Y_{AVU} (given ϕ = 18 in.)
29660.99	29.66
49521.99	24.76
69806.25	23.27
102905.24	25.73
141112.14	28.22
184426.96	30.74
232849.70	33.26
286380.34	35.80
345018.91	38.34
408765.40	40.88

Y_{TU} (given ϕ = 19 in.)	Y_{AVU} (given ϕ = 19 in.)
30916.28	30.92
52032.56	26.02
74997.86	25.00
110093.76	27.52
150494.03	30.10
196198.69	32.70
247207.71	35.32
303521.12	37.94
365138.89	40.57
432061.04	43.21

Y_{TU} (given ϕ = 20 in.)	Y_{AVU} (given ϕ = 20 in.)
32210.25	32.21
54620.51	27.31
80382.14	26.79
117539.18	29.38
160197.06	32.04
208355.77	34.73
262015.32	37.43
321175.70	40.15
385836.92	42.87
455998.95	45.60

Y_{TU} (given ϕ = 21 in.)	Y_{AVU} (given ϕ = 21 in.)
33542.91	33.54
57285.83	28.64
85959.10	28.65
125241.51	31.31
170221.22	34.04
220898.22	36.82
277272.51	39.61
339344.09	42.42
407112.97	45.23
480579.13	48.06

Continued

Y_{TU} (given ϕ = 22 in.)	Y_{AVU} (given ϕ = 22 in.)
34914.26	34.91
60028.52	30.01
91728.74	30.58
133200.74	33.30
180566.51	36.11
233826.02	38.97
292979.28	41.85
358026.29	44.75
428967.06	47.66
505801.56	50.58

Y_{TU} (given ϕ = 23 in.)	Y_{AVU} (given ϕ = 23 in.)
36324.30	36.32
62848.59	31.42
97691.05	32.56
141416.89	35.35
191232.93	38.25
247139.18	41.19
309135.64	44.16
377222.31	47.15
451399.18	50.16
531666.27	53.17

Y_{TU} (given ϕ = 24 in.)	Y_{AVU} (given ϕ = 24 in.)
37773.02	37.77
65746.03	32.87
103846.05	34.62
149889.93	37.47
202220.48	40.44
260837.69	43.47
325741.58	46.53
396932.13	49.62
474409.34	52.71
558173.23	55.82

Y_{TU} (given ϕ = 25 in.)	Y_{AVU} (given ϕ = 25 in.)
39260.42	39.26
68720.85	34.36
110193.72	36.73
158619.88	39.65
213529.16	42.71
274921.57	45.82
342797.10	48.97
417155.76	52.14
497997.54	55.33
585322.44	58.53

Y_{TU} (given ϕ = 26 in.)	Y_{AVU} (given ϕ = 26 in.)
40786.52	40.79
72541.00	36.27
116734.07	38.91
167606.73	41.90
225158.97	45.03
289390.80	48.23
360302.21	51.47
437893.20	54.74
522163.78	58.02
613113.93	61.31

Y_{TU} (given ϕ = 27 in.)	Y_{AVU} (given ϕ = 27 in.)
42351.30	42.35
76959.76	38.48
123467.11	41.16
176850.49	44.21
237109.92	47.42
304245.39	50.71
378256.90	54.04
459144.45	57.39
546908.06	60.77
641547.68	64.15

Continued

Y_{TU} (given ϕ = 28 in.)	Y_{AVU} (given ϕ = 28 in.)
43954.76	43.95
81506.98	40.75
130392.82	43.46
186351.16	46.59
249382.00	49.88
319485.34	53.25
396661.17	56.67
480909.51	60.11
572230.36	63.58
670623.69	67.06

Y_{TU} (given ϕ = 29 in.)	Y_{AVU} (given ϕ = 29 in.)
45596.92	45.60
86182.65	43.09
137511.21	45.84
196108.72	49.03
261975.20	52.40
335110.64	55.85
415515.03	59.36
503188.39	62.90
598130.70	66.46
700341.96	70.03

Y_{TU} (given ϕ = 30 in.)	Y_{AVU} (given ϕ = 30 in.)
47277.76	47.28
90986.77	45.49
144822.28	48.27
206123.20	51.53
274889.55	54.98
351121.30	58.52
434818.48	62.12
525981.08	65.75
624609.09	69.40
730702.51	73.07

Y_{TU} (given ϕ = 31 in.)	Y_{AVU} (given ϕ = 31 in.)
48997.29	49.00
95919.34	47.96
152326.03	50.78
216394.58	54.10
288125.02	57.63
367517.33	61.25
454571.51	64.94
549287.57	68.66
651665.51	72.41
761705.31	76.17

Y_{TU} (given ϕ = 32 in.)	Y_{AVU} (given ϕ = 32 in.)
50755.50	50.76
100980.37	50.49
160022.45	53.34
226922.87	56.73
301681.62	60.34
384298.70	64.05
474774.12	67.82
573107.87	71.64
679299.95	75.48
793350.37	79.34

Y_{TU} (given ϕ = 33 in.)	Y_{AVU} (given ϕ = 33 in.)
52552.40	52.55
106169.85	53.08
167911.56	55.97
237708.06	59.43
315559.35	63.11
401465.44	66.91
495426.31	70.78
597441.98	74.68
707512.44	78.61
825637.70	82.56

Continued

Y_{TU} (given ϕ = 34 in.)	Y_{AVU} (given ϕ = 34 in.)
55233.46	55.23
111487.78	55.74
175993.34	58.66
248750.15	62.19
329758.22	65.95
419017.53	69.84
516528.08	73.79
622289.91	77.79
736302.97	81.81
858567.28	85.86

Y_{TU} (given ϕ = 35 in.)	Y_{AVU} (given ϕ = 35 in.)
58048.23	58.05
116934.16	58.47
184267.80	61.42
260049.15	65.01
344278.21	68.86
436954.98	72.83
538079.45	76.87
647651.64	80.96
765671.54	85.07
892139.13	89.21

Y_{TU} (given ϕ = 36 in.)	Y_{AVU} (given ϕ = 36 in.)
60927.21	60.93
122508.99	61.25
192734.94	64.24
271605.06	67.90
359119.34	71.82
455277.79	75.88
560080.41	80.01
673527.18	84.19
795618.15	88.40
926353.25	92.64

Y_{TU} (given ϕ = 37 in.)	T_{AVU} (given ϕ = 37 in.)
63870.43	63.87
128212.28	64.11
201394.77	67.13
283417.87	70.85
374281.60	74.86
473985.96	79.00
582530.94	83.22
699916.54	87.49
826142.77	91.79
961209.62	96.12

Y_{TU} (given ϕ = 38 in.)	T_{AVU} (given ϕ = 38 in.)
66877.87	66.88
134044.02	67.02
210247.26	70.08
295487.59	73.87
389764.99	77.95
493079.47	82.18
605431.05	86.49
726819.71	90.85
857245.44	95.25
996708.25	99.67

Y_{TU} (given ϕ = 39 in.)	T_{AVU} (given ϕ = 39 in.)
69949.54	69.95
140004.22	70.00
219292.44	73.10
307814.20	76.95
405569.51	81.11
512558.36	85.43
628780.75	89.83
754236.67	94.28
888926.15	98.77
1032849.20	103.28

Continued

Y_{TU} (given ϕ = 40 in.)	Y_{AVU} (given ϕ = 40 in.)
73085.43	73.09
146092.86	73.05
228530.30	76.18
320397.73	80.10
421695.16	84.34
532422.59	88.74
652580.03	93.23
782167.46	97.77
921184.90	102.35
1069632.30	106.96

Y_{TU} (given ϕ = 41 in.)	Y_{AVU} (given ϕ = 41 in.)
76285.55	76.29
152309.96	76.15
237960.83	79.32
333238.16	83.31
438141.95	87.63
552672.19	92.11
676828.90	96.69
810612.06	101.33
954021.68	106.00
1105526.20	110.55

Y_{TU} (given ϕ = 42 in.)	Y_{AVU} (given ϕ = 42 in.)
79549.90	79.55
158655.52	79.33
247584.05	82.53
346335.50	86.58
454909.87	90.98
573307.15	95.55
701527.34	100.22
839570.46	104.95
987436.50	109.72
1136799.90	113.68

Y_{TU} (given ϕ = 43 in.)	Y_{AVU} (given ϕ = 43 in.)
82878.47	82.88
165129.52	82.56
257399.94	85.80
359689.74	89.92
471998.91	94.40
594327.46	99.05
726675.37	103.81
869042.68	108.63
1021429.40	113.49
1168460.50	116.85

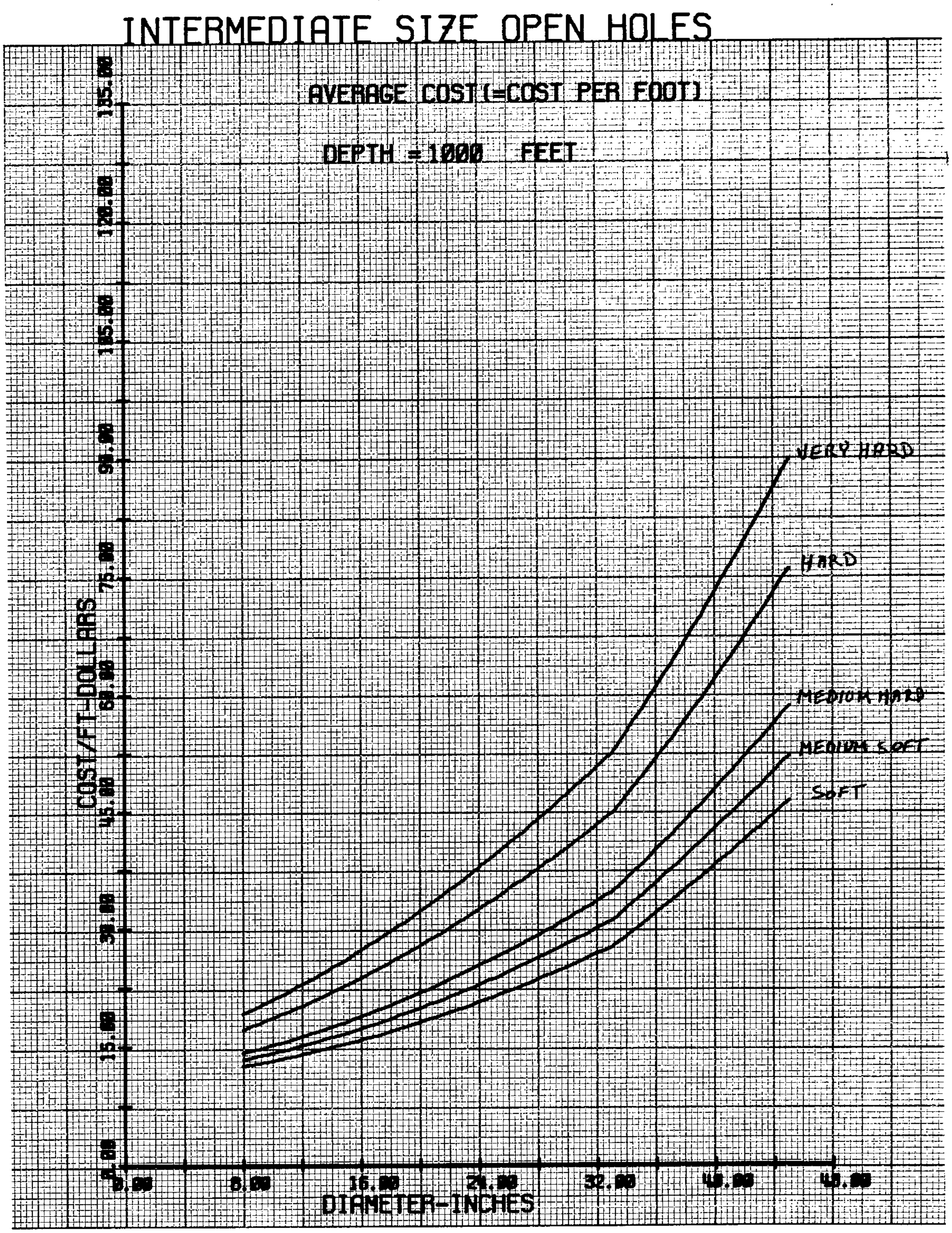
Y_{TU} (given ϕ = 44 in.)	Y_{AVU} (given ϕ = 44 in.)
86271.27	86.27
171731.97	85.87
267408.51	89.14
373300.88	93.33
489409.09	97.88
615733.12	102.62
752273.00	107.47
899028.69	112.38
1056000.20	117.33
1200508.00	120.05

Y_{TU} (given ϕ = 45 in.)	Y_{AVU} (given ϕ = 45 in.)
89728.30	89.73
178462.88	89.23
277609.77	92.54
387168.94	96.79
507140.40	101.43
637524.16	106.25
778320.20	111.19
929528.54	116.19
1091149.20	121.24
1232942.30	123.29

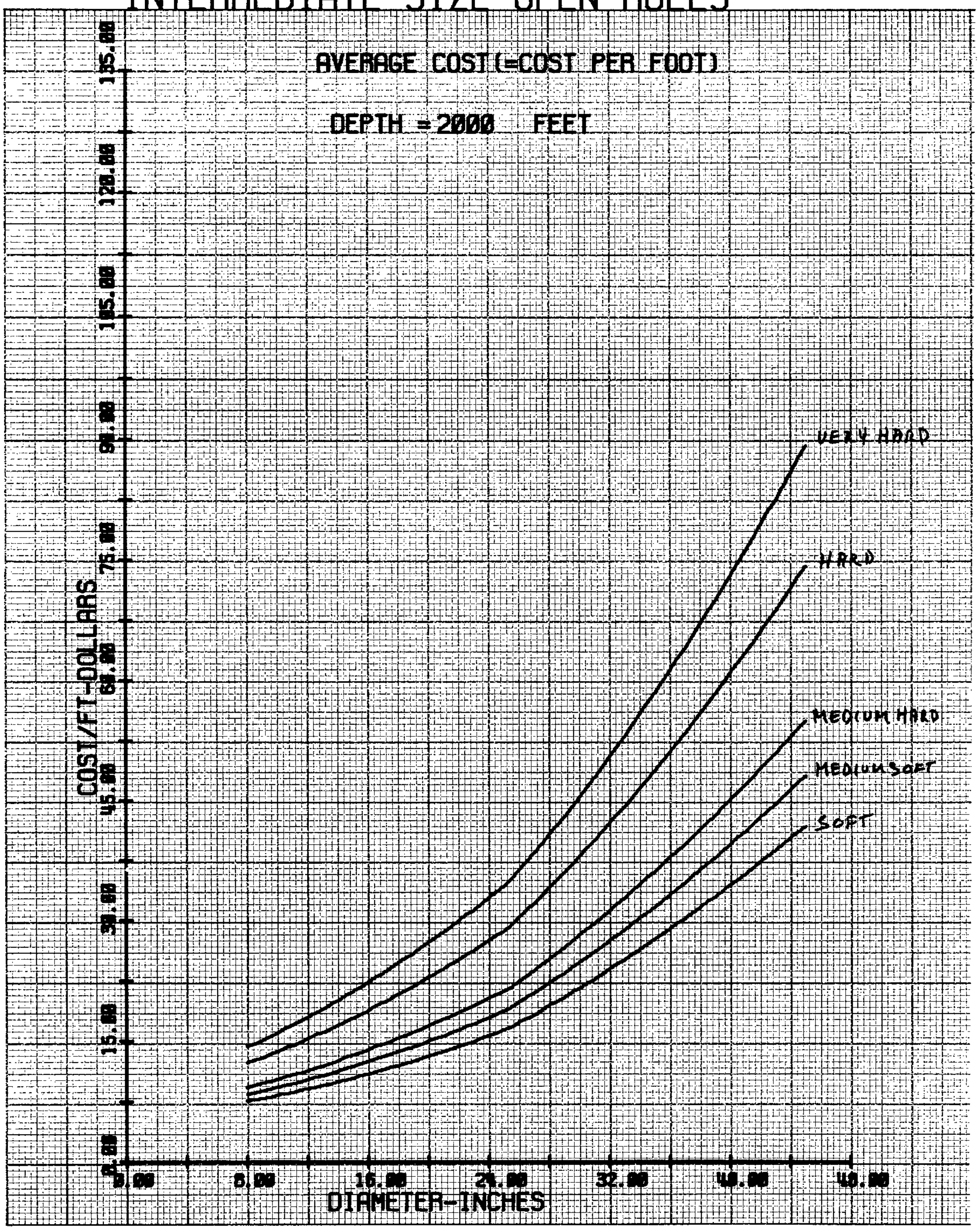
INTERMEDIATE SIZE OPEN HOLE COST AS A

FUNCTION OF THE HOLE DIAMETER FOR

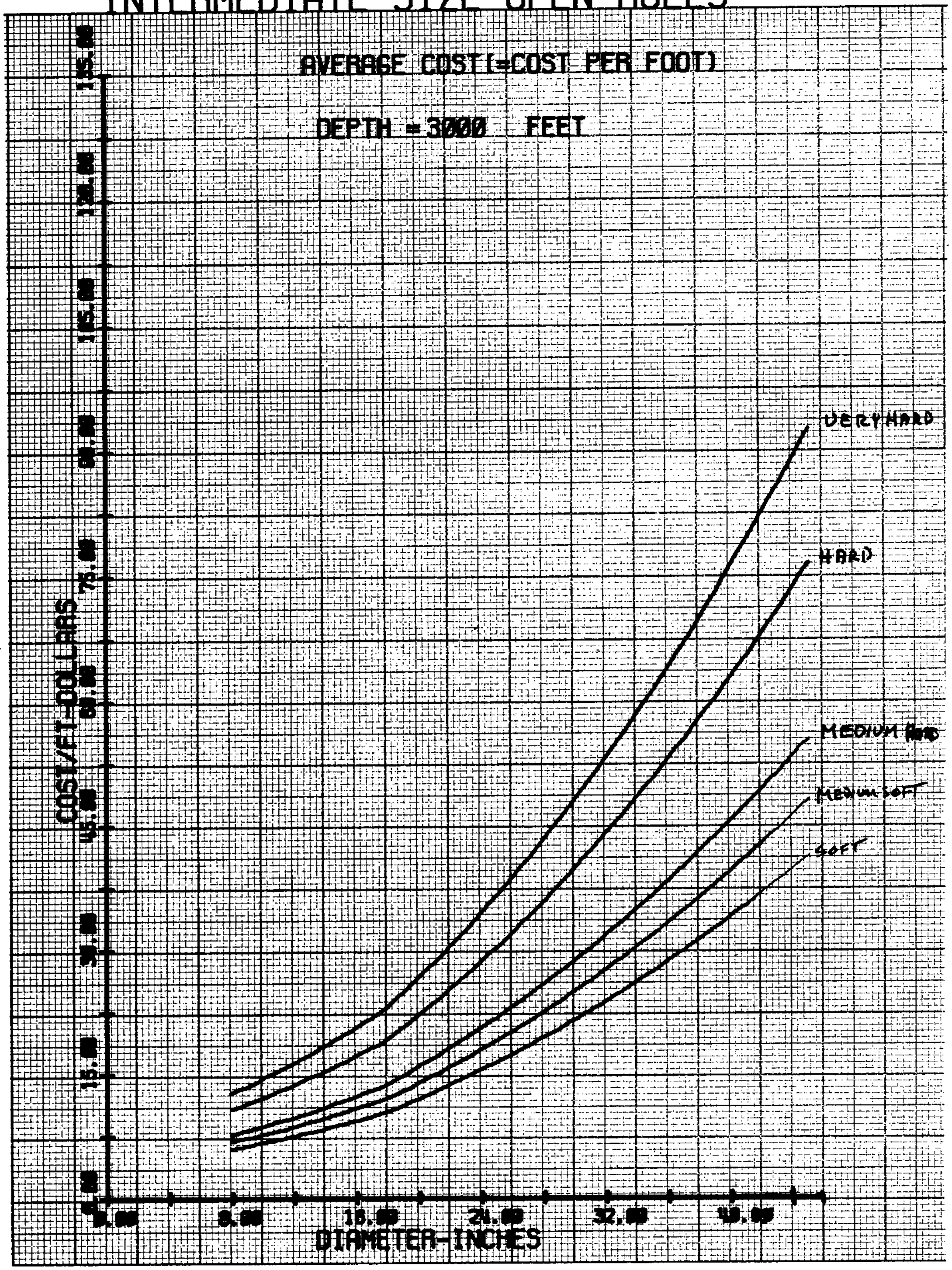
1,000 to 10,000 FEET DEPTH


INTERMEDIATE SIZE OPEN HOLES
AVERAGE COST (=COST PER FOOT)
DEPTH = 1000 FEET
COST/FT-DOLLARS
DIAMETER-INCHES
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT

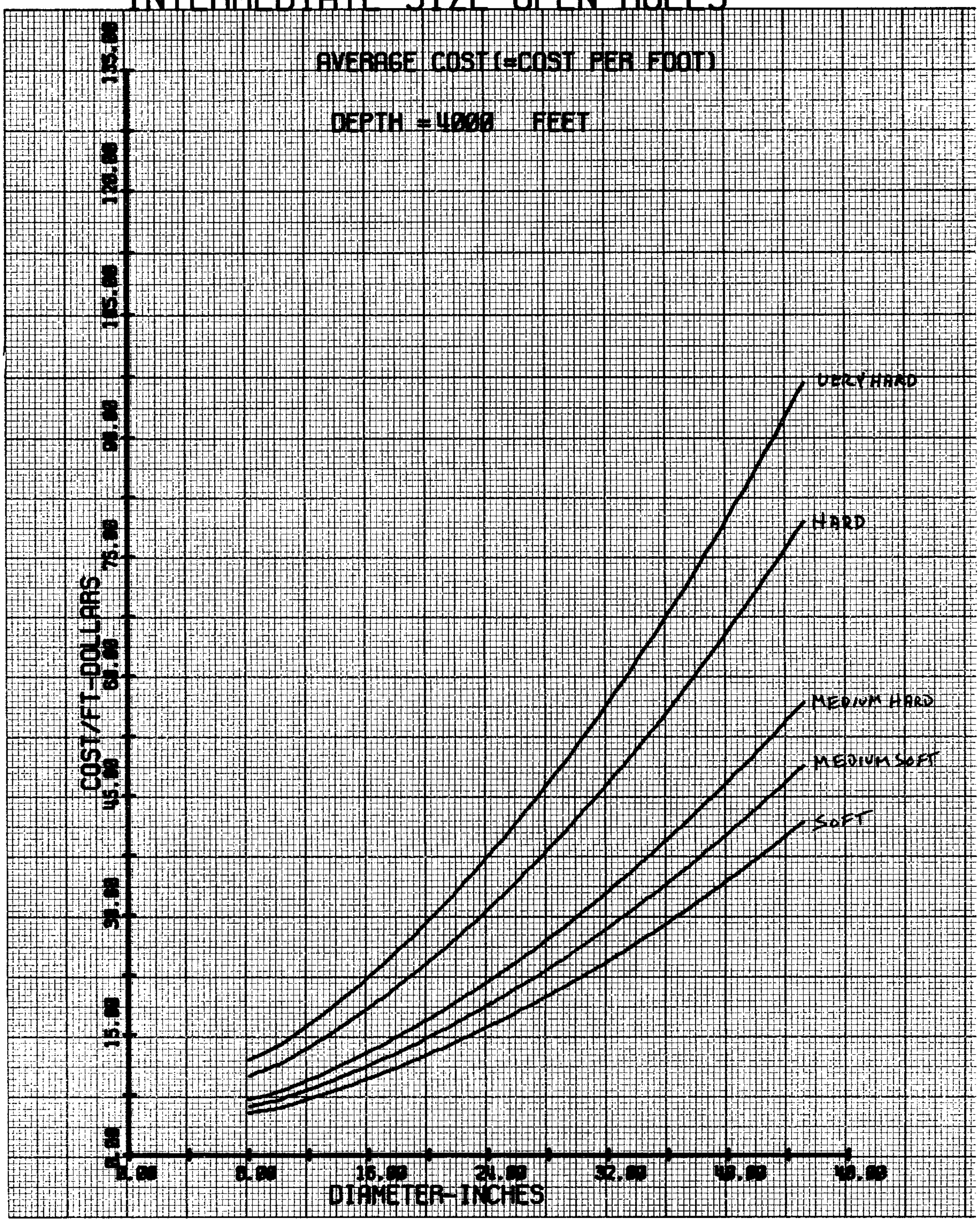
INTERMEDIATE SIZE OPEN HOLES



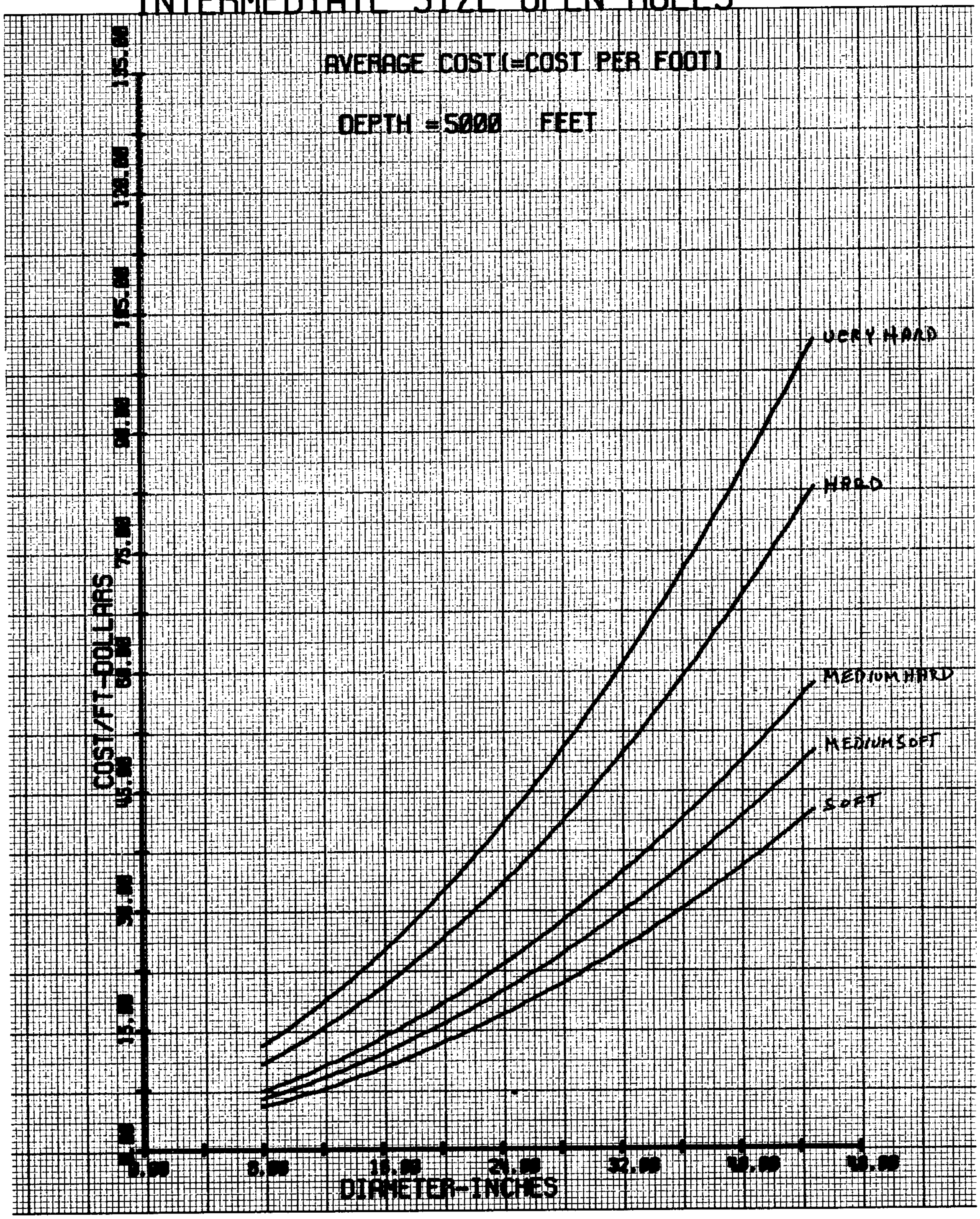
INTERMEDIATE SIZE OPEN HOLES



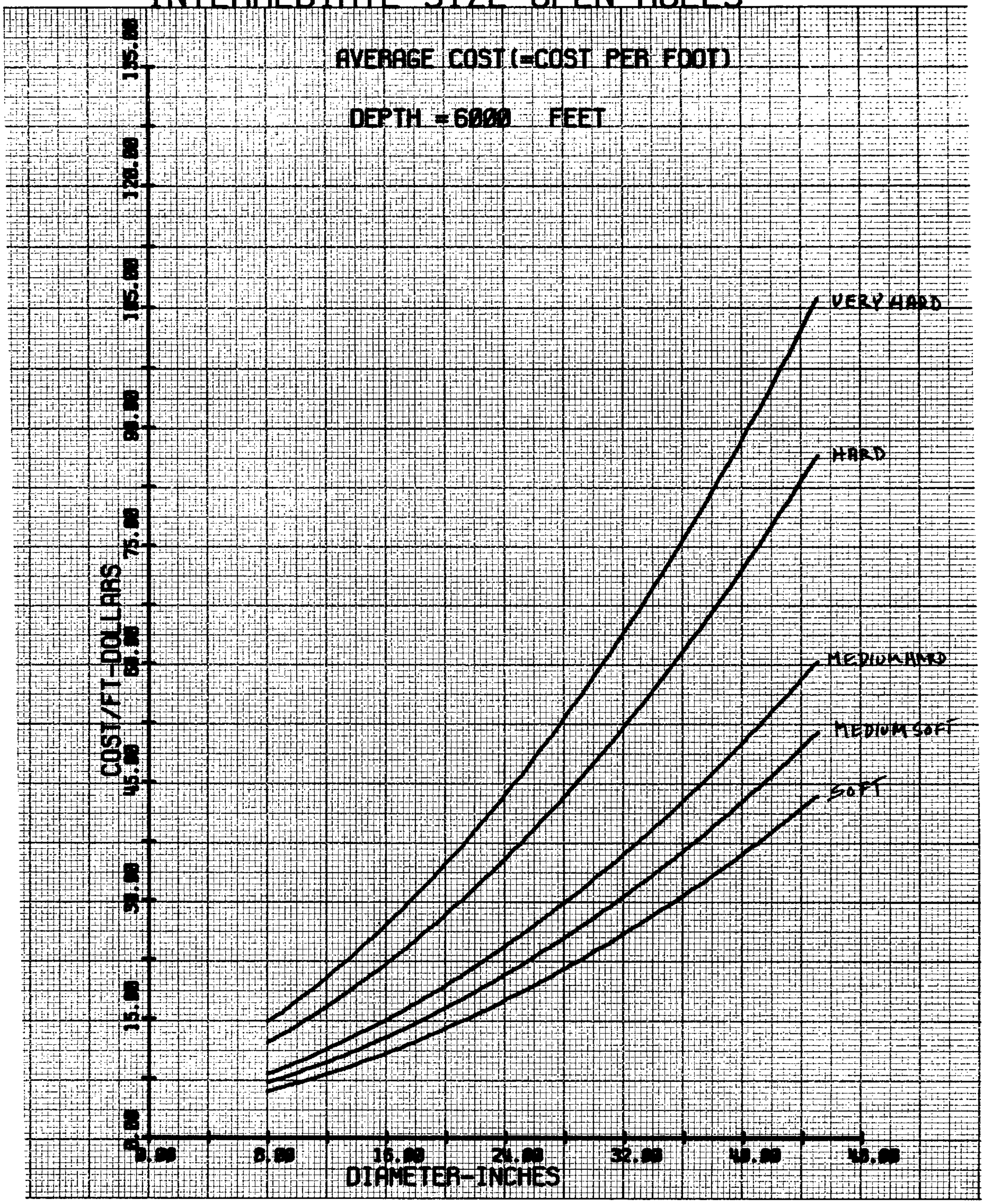
INTERMEDIATE SIZE OPEN HOLES



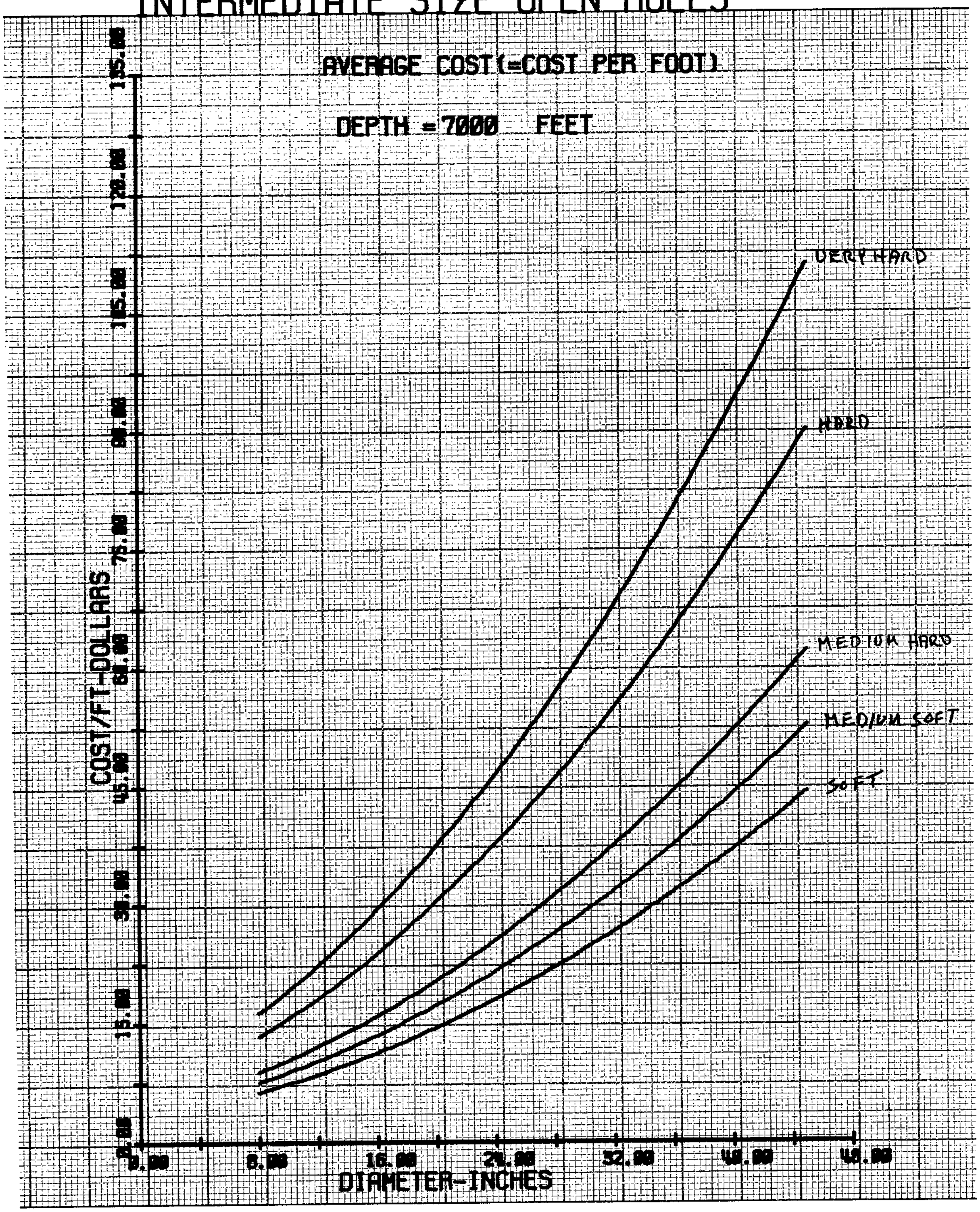
INTERMEDIATE SIZE OPEN HOLES



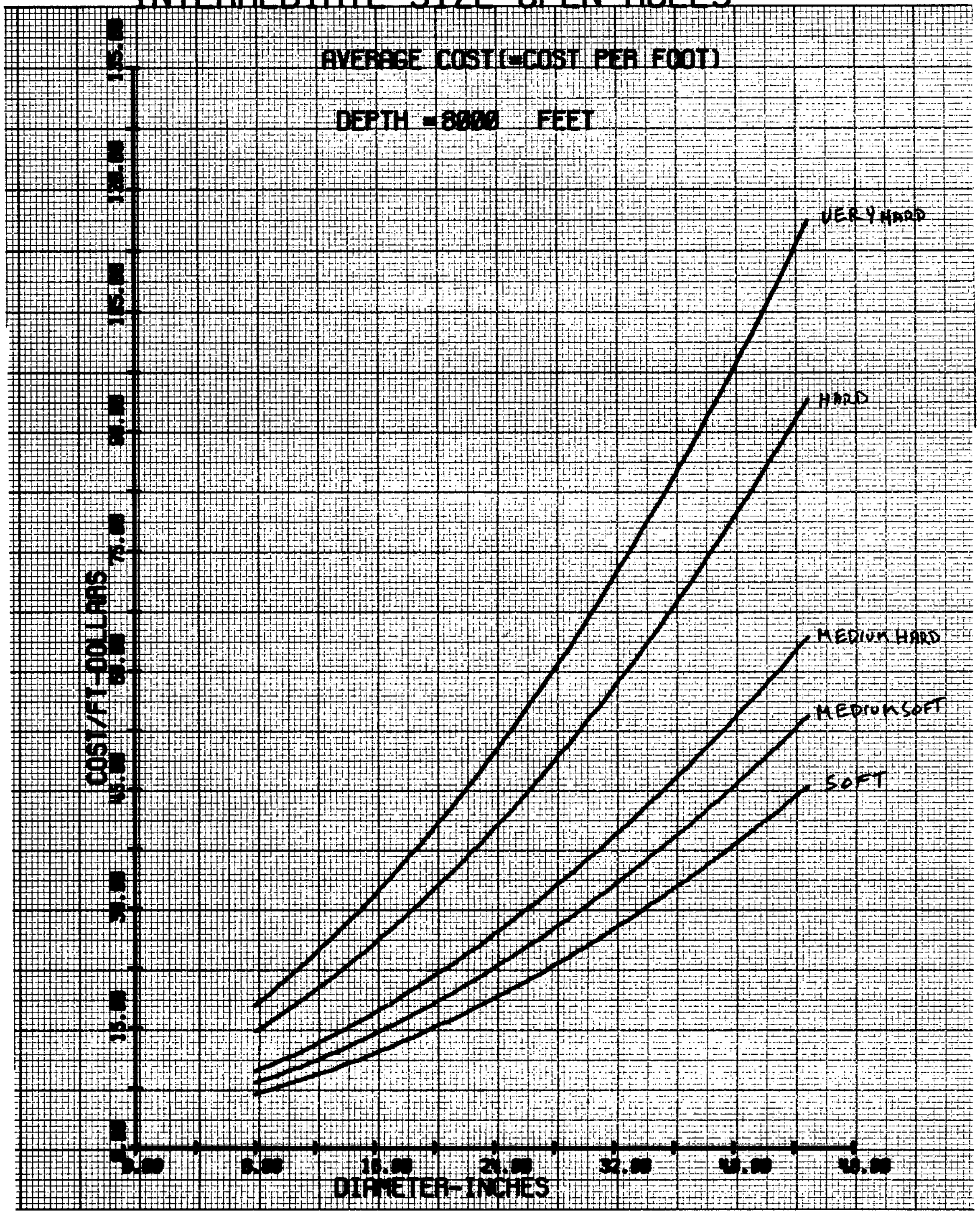
INTERMEDIATE SIZE OPEN HOLES

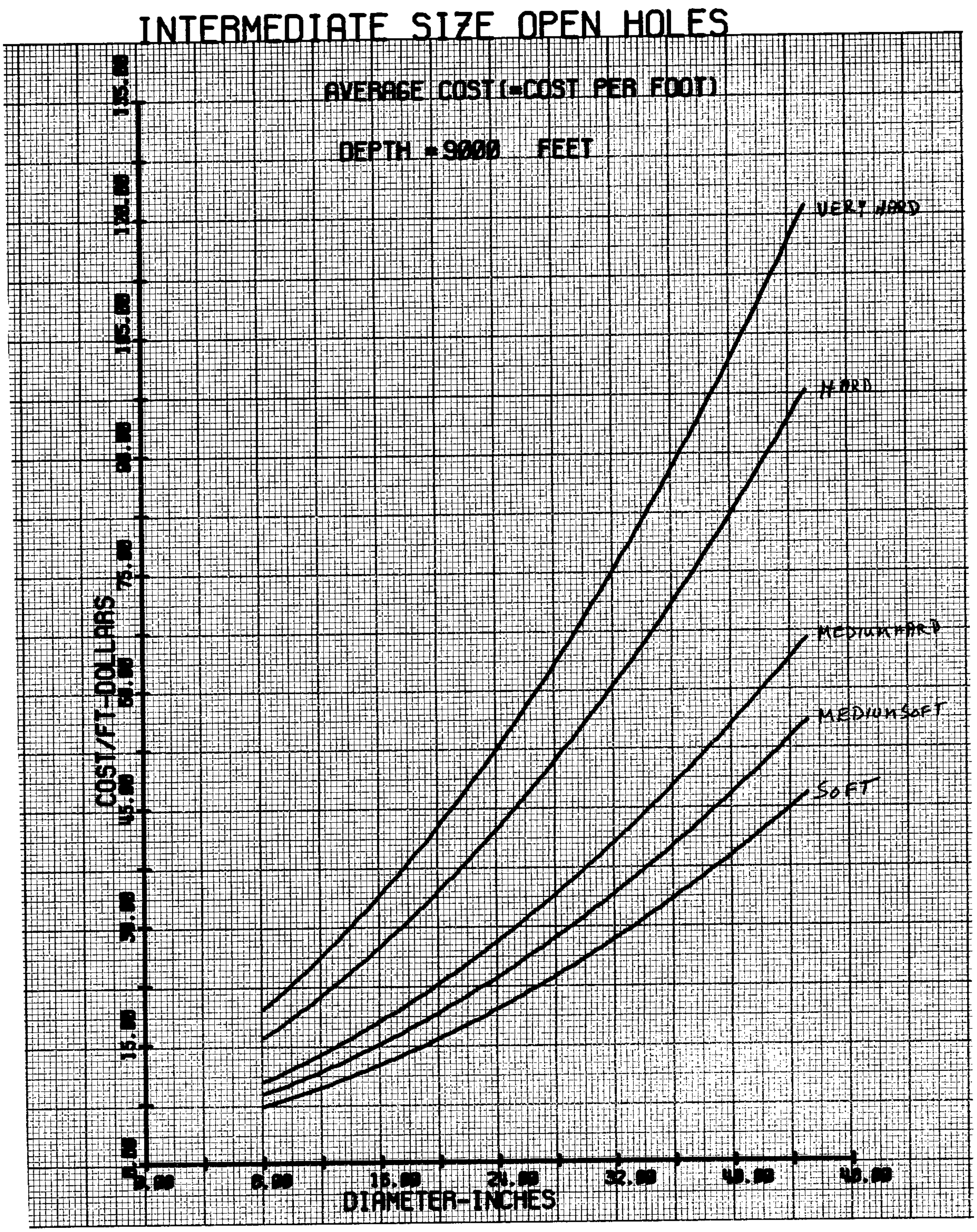


INTERMEDIATE SIZE OPEN HOLES

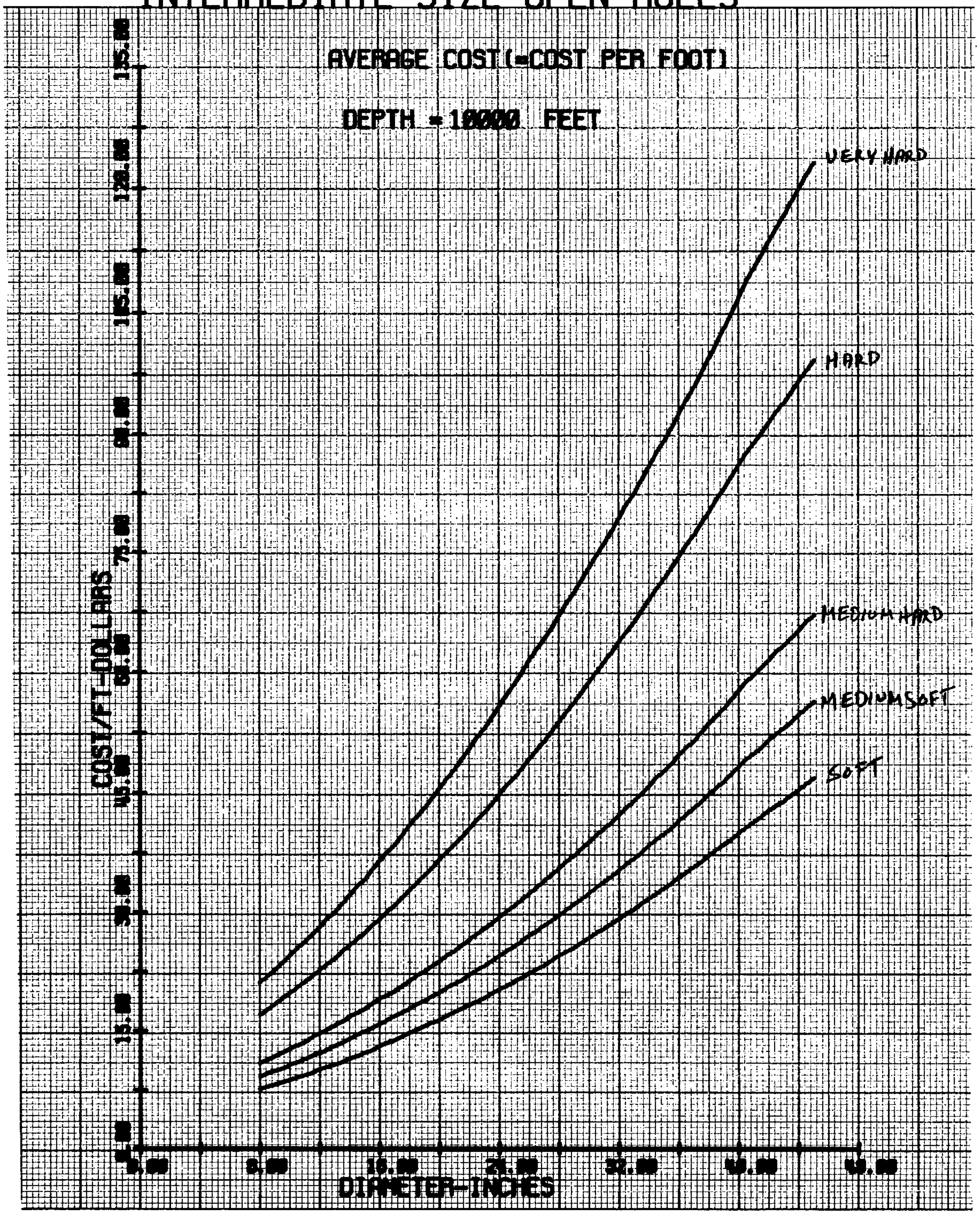


INTERMEDIATE SIZE OPEN HOLES




INTERMEDIATE SIZE OPEN HOLES
AVERAGE COST(=COST PER FOOT)
DEPTH =9000 FEET
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT
COST/FT-DOLLARS
DIAMETER-INCHES

INTERMEDIATE SIZE OPEN HOLES

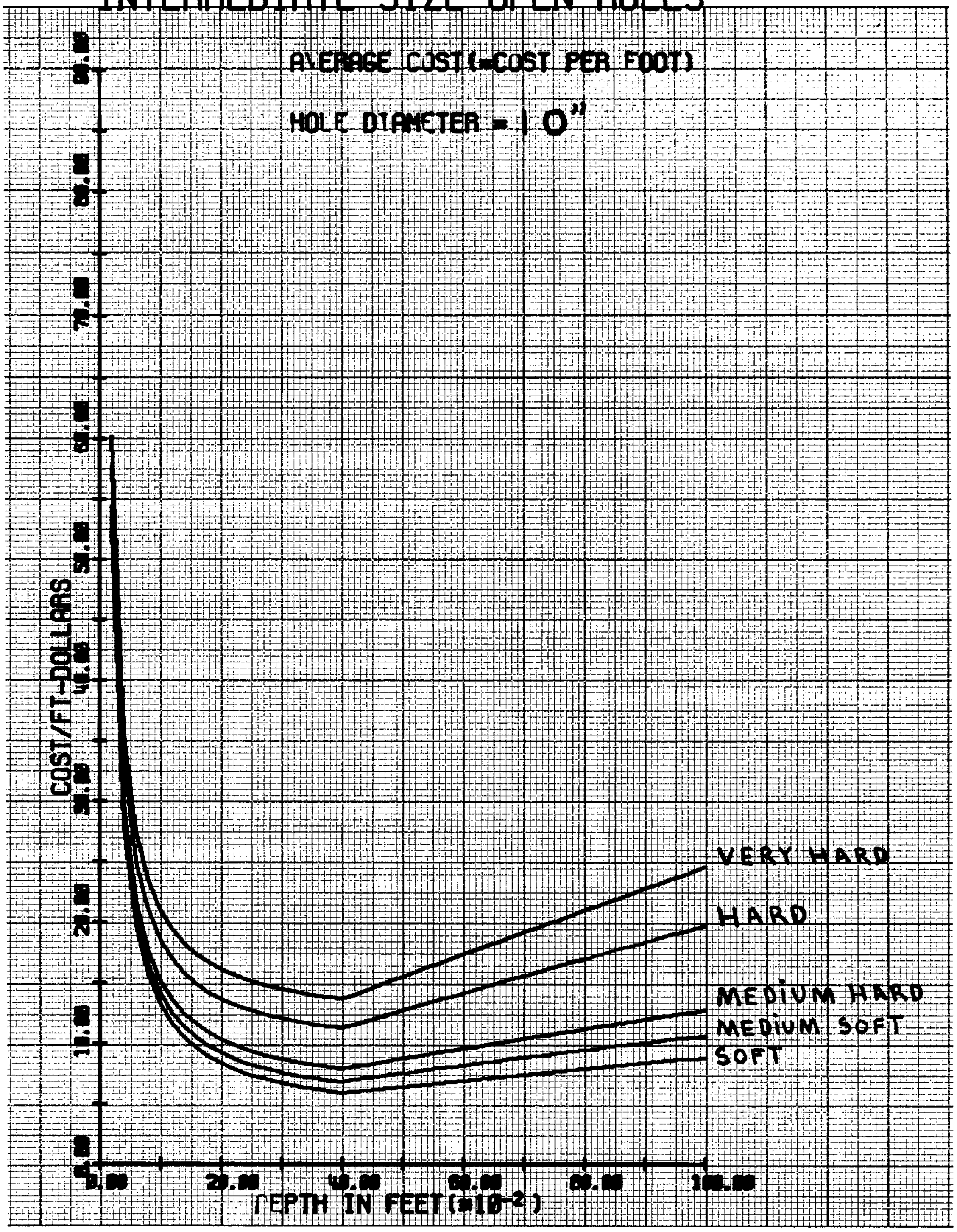


INTERMEDIATE SIZE OPEN HOLE COST

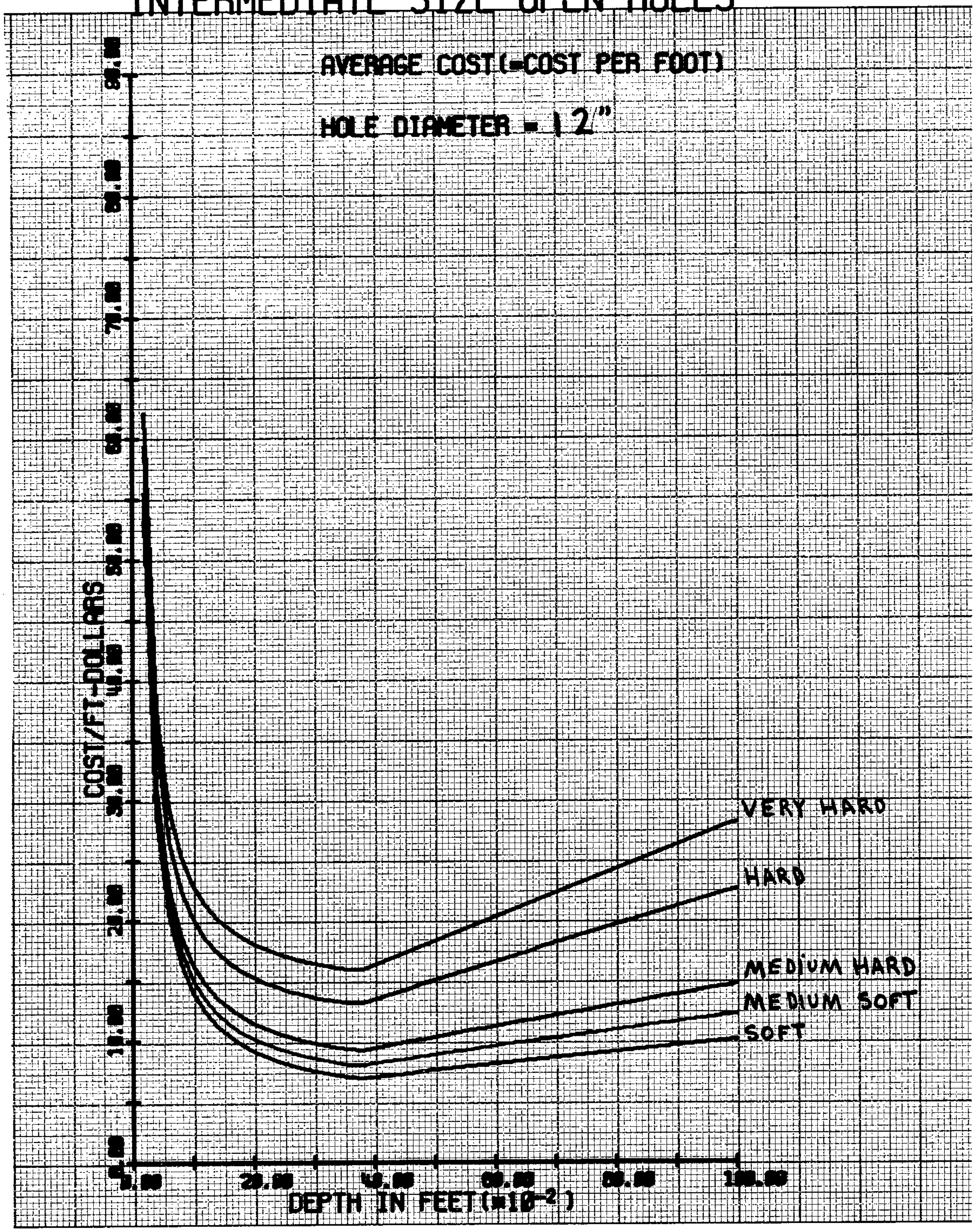
AS A FUNCTION OF DEPTH FOR

10 INCHES TO 30 INCHES DIAMETERS

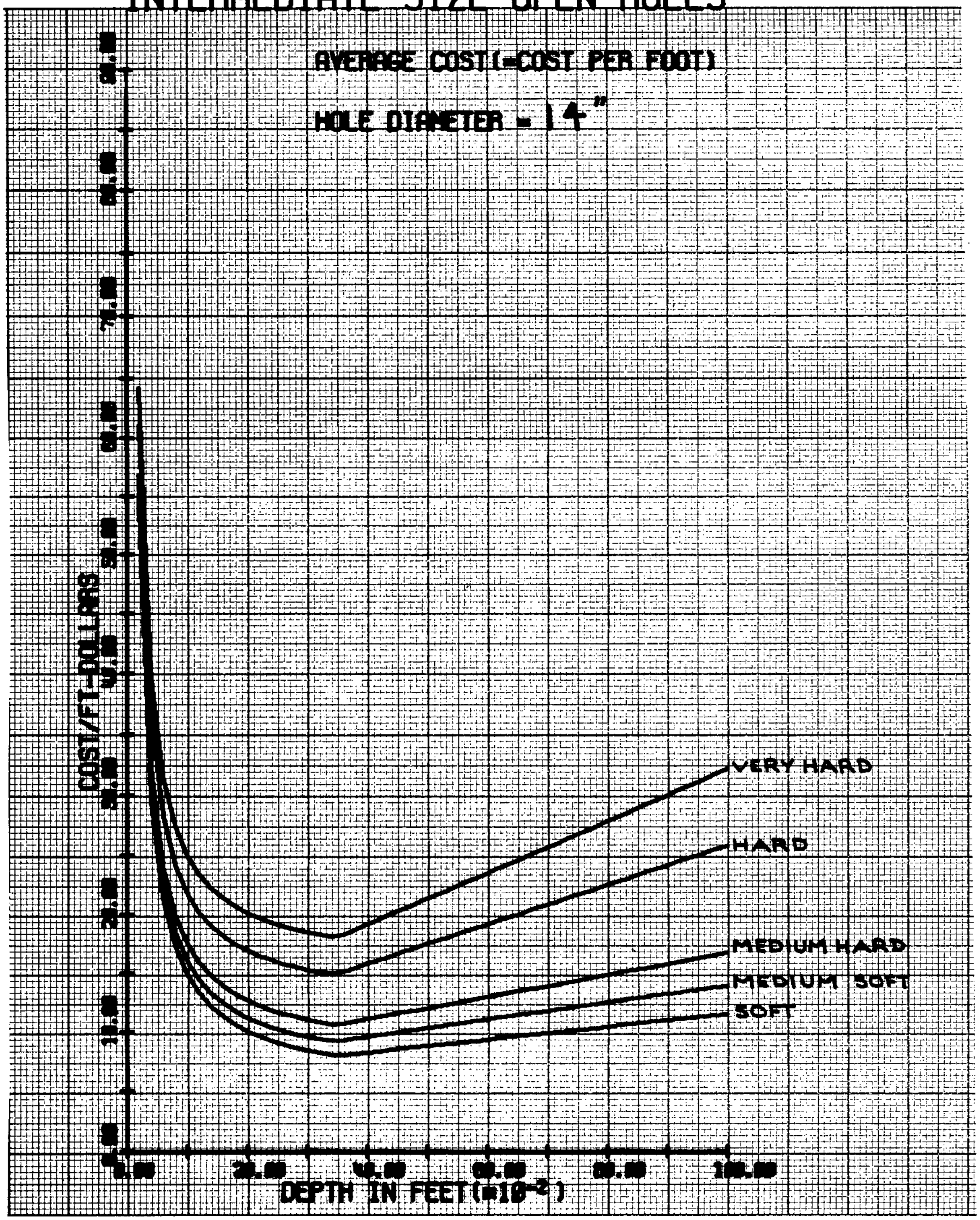
INTERMEDIATE SIZE OPEN HOLES



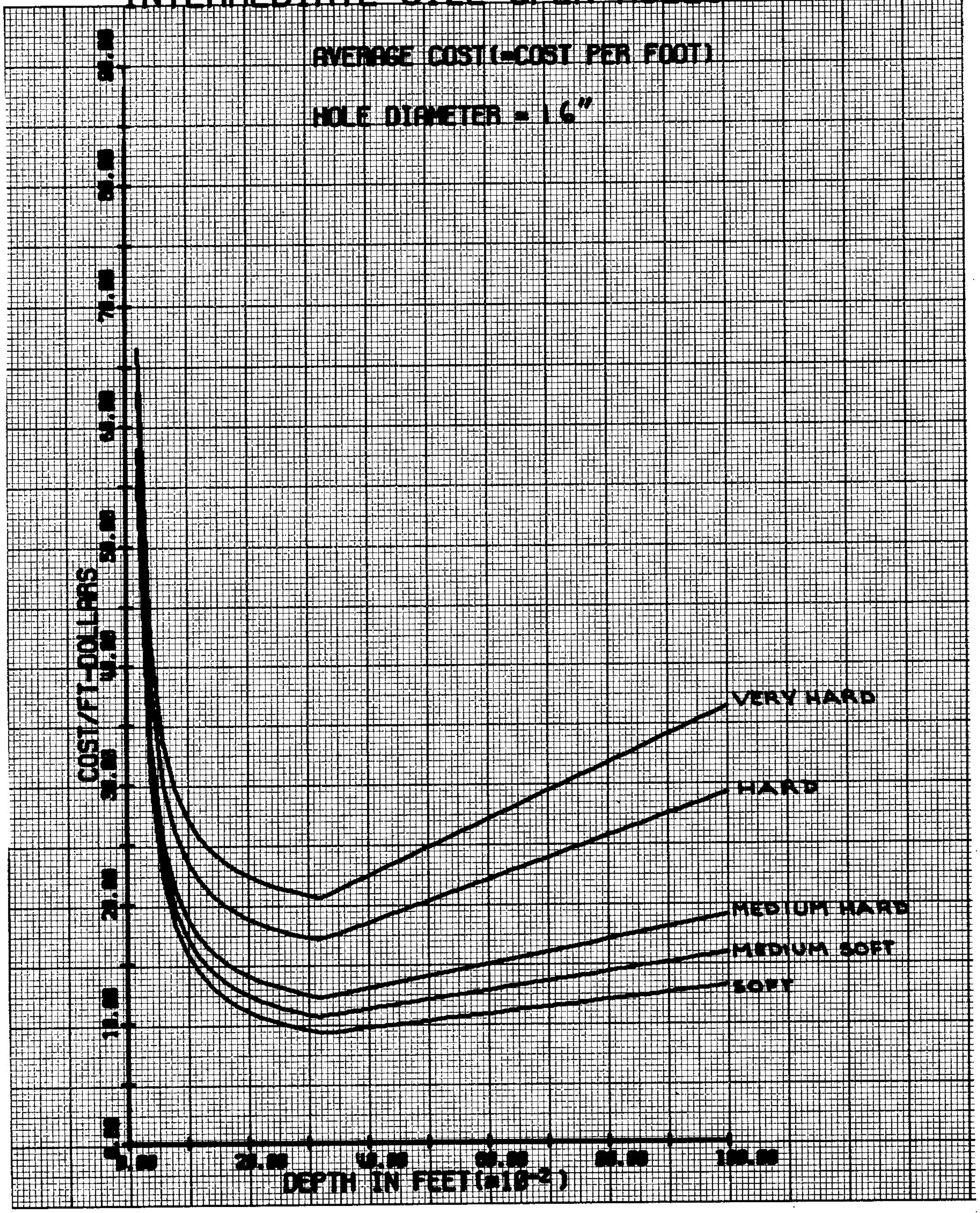
INTERMEDIATE SIZE OPEN HOLES



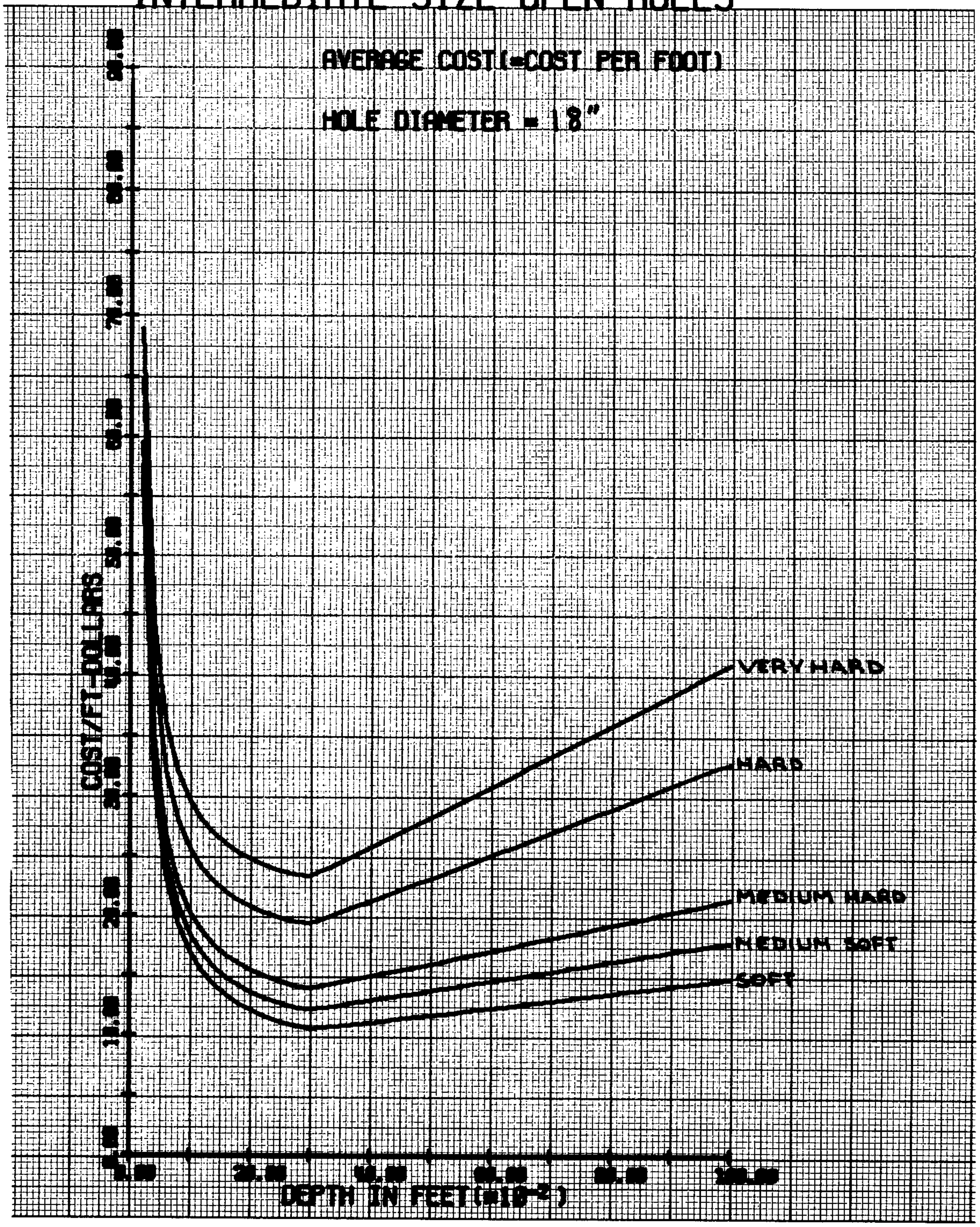
INTERMEDIATE SIZE OPEN HOLES



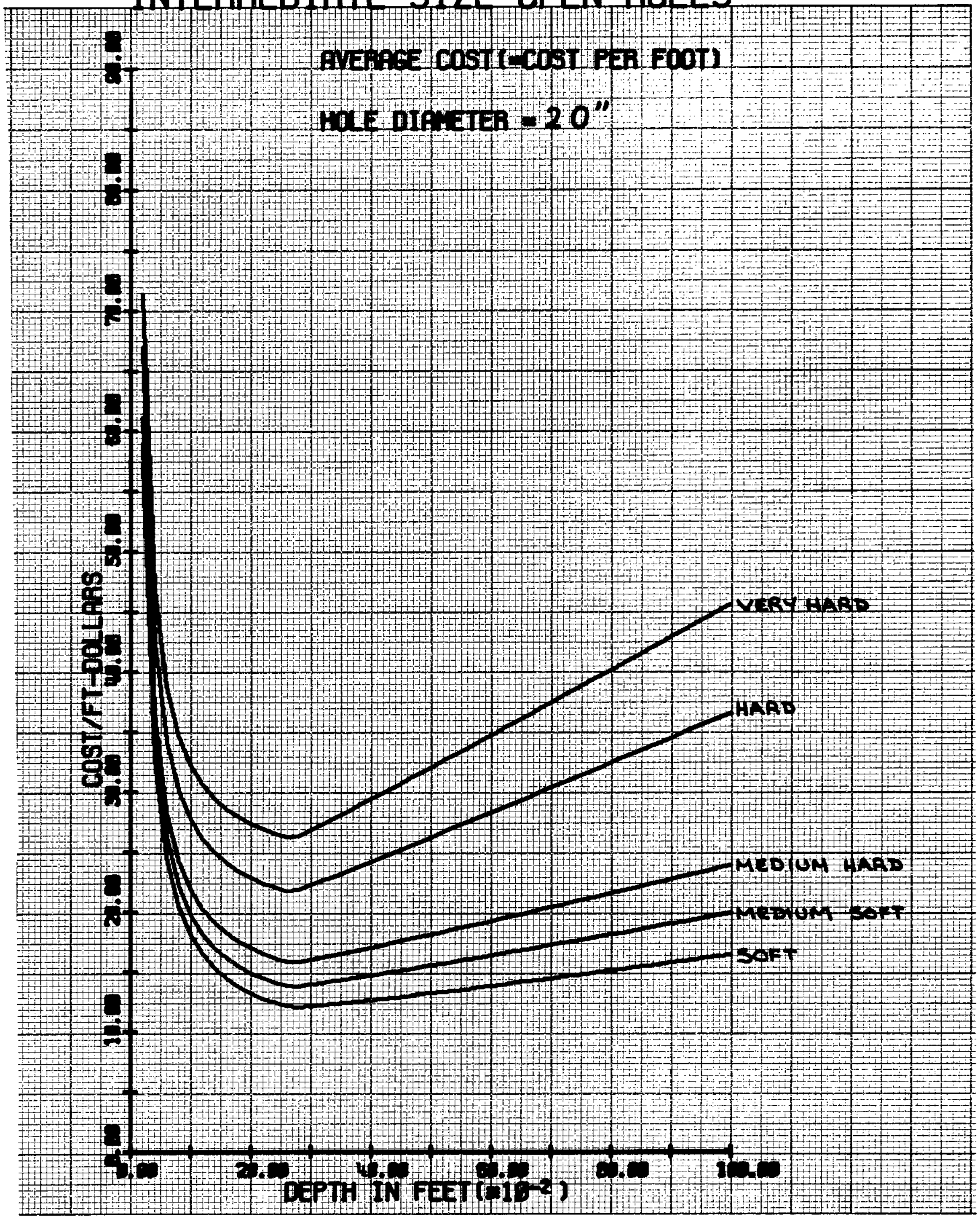
INTERMEDIATE SIZE OPEN HOLES

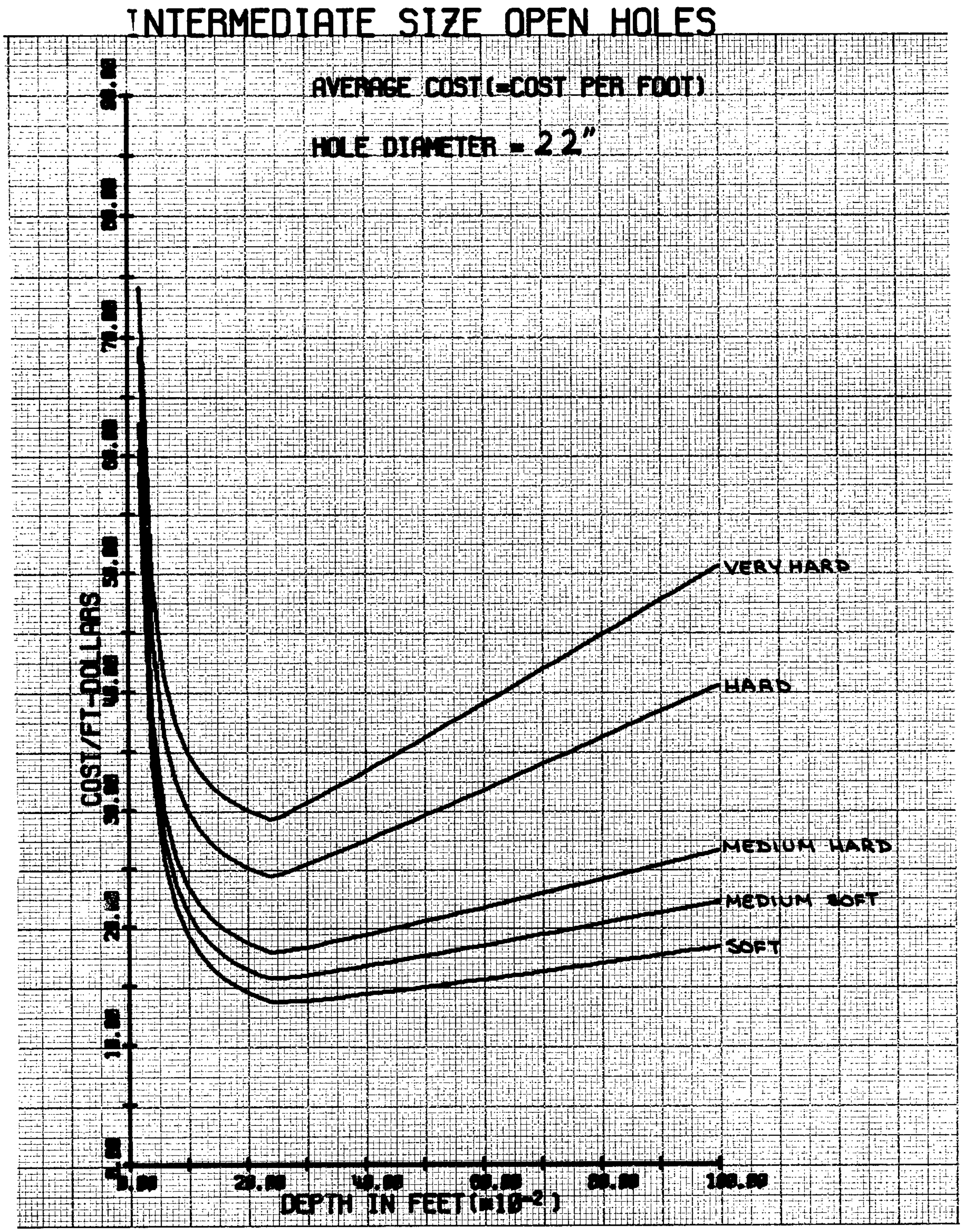


INTERMEDIATE SIZE OPEN HOLES

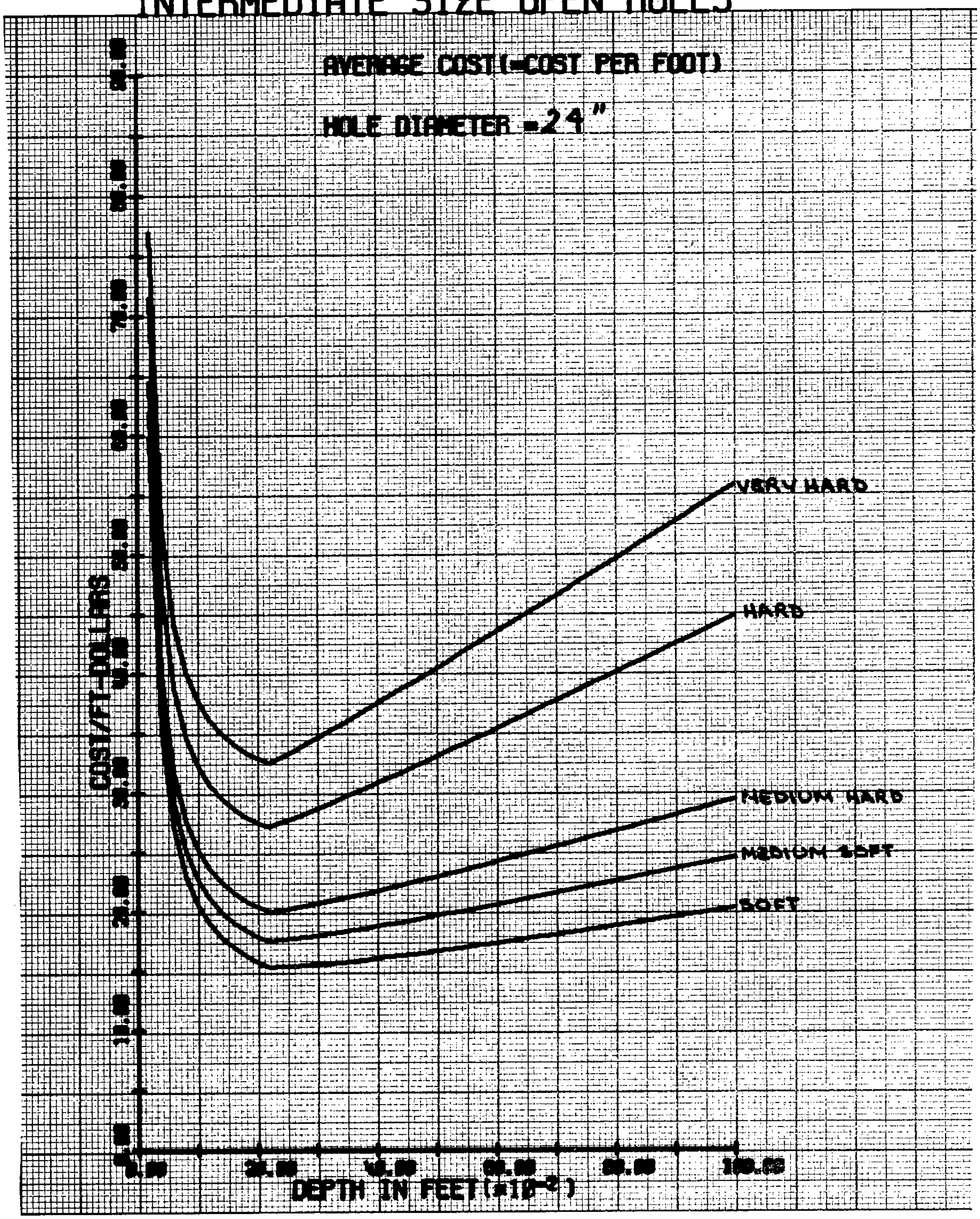


INTERMEDIATE SIZE OPEN HOLES

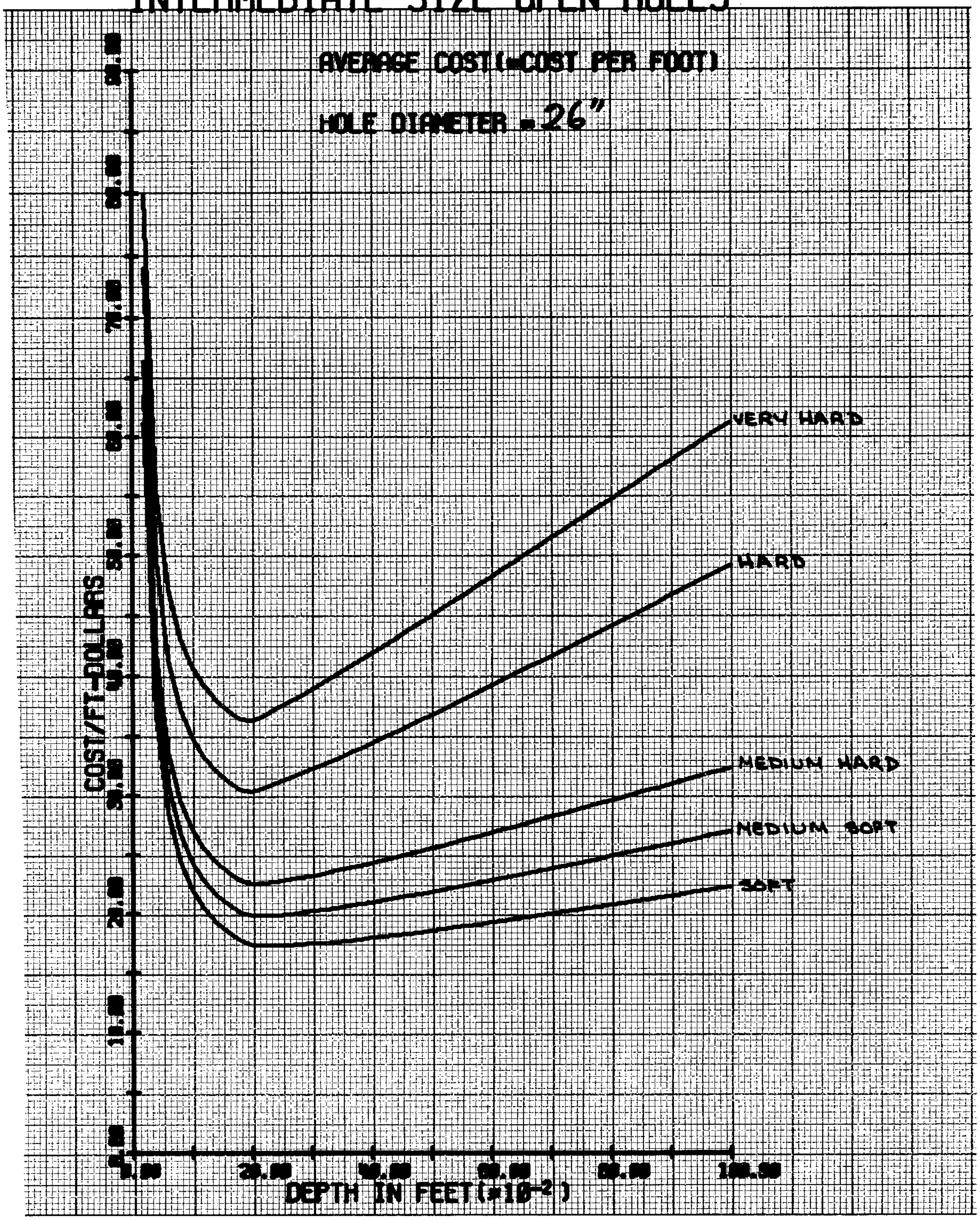



INTERMEDIATE SIZE OPEN HOLES
AVERAGE COST(=COST PER FOOT)
HOLE DIAMETER = 22"
COST/FT-DOLLARS
DEPTH IN FEET(*10^-2)
VERY HARD
HARD
MEDIUM HARD
MEDIUM SOFT
SOFT
0.00
20.00
40.00
60.00
80.00
100.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00

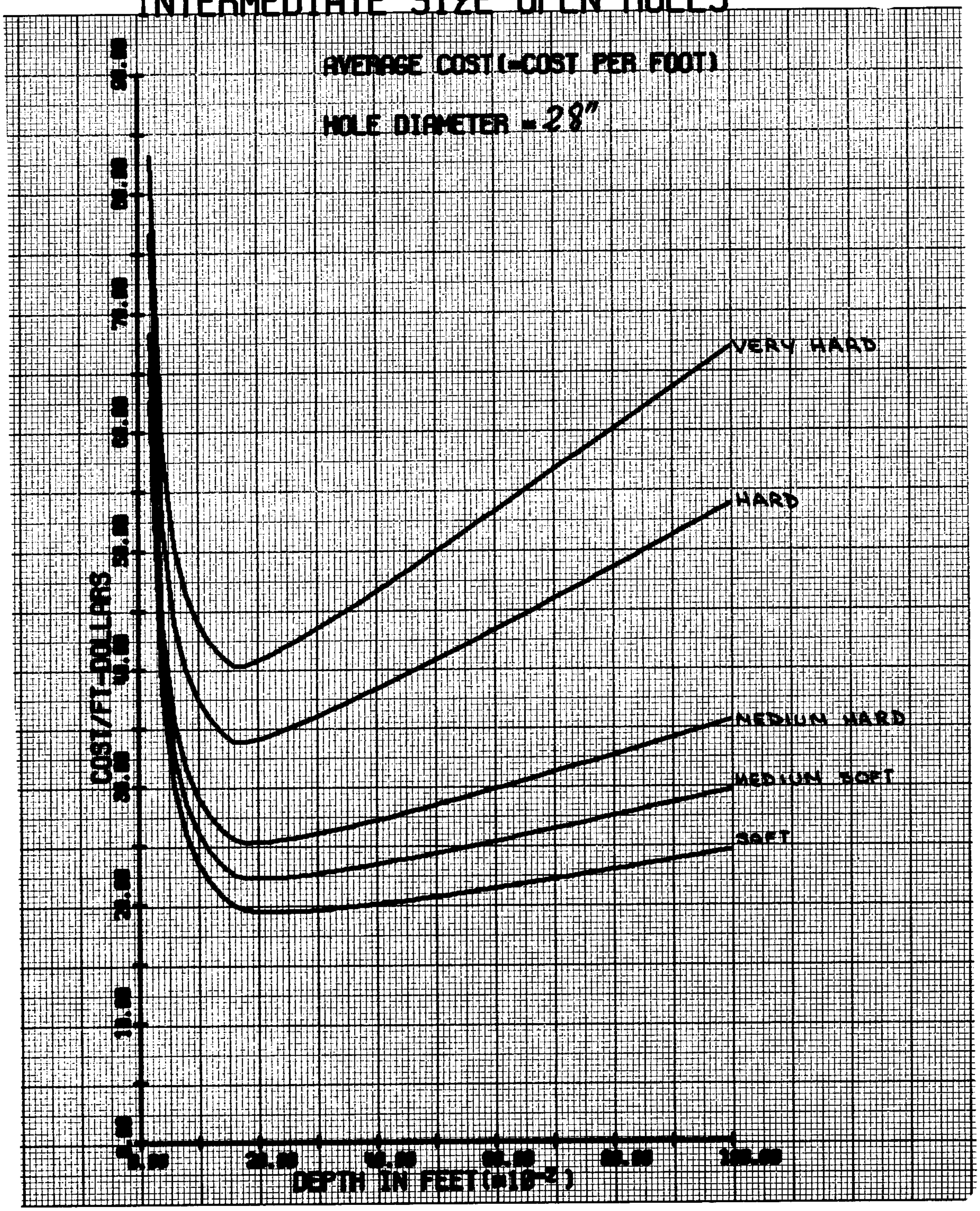
INTERMEDIATE SIZE OPEN HOLES



INTERMEDIATE SIZE OPEN HOLES



INTERMEDIATE SIZE OPEN HOLES



INTERMEDIATE SIZE OPEN HOLES

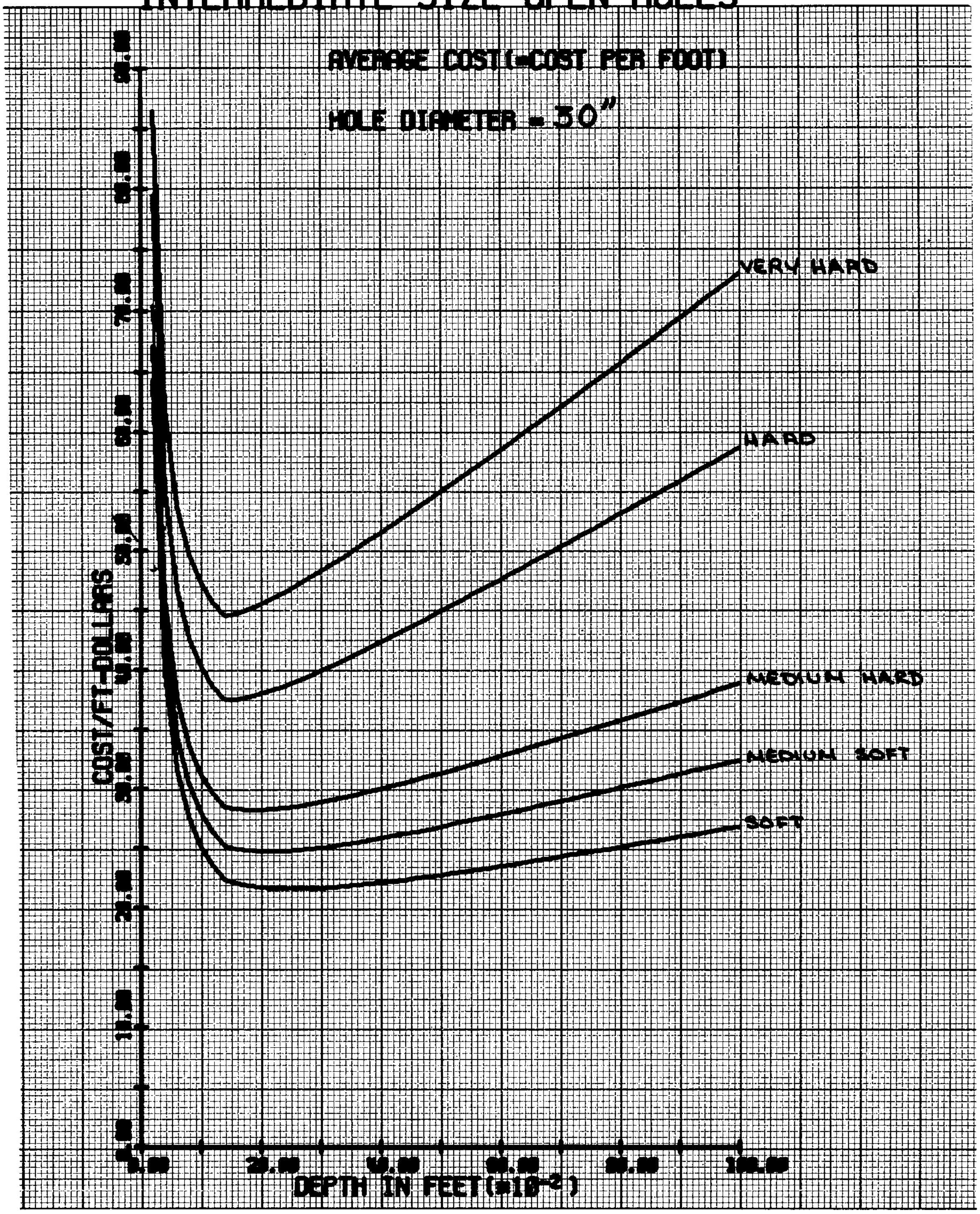


Table 25

DIFFERENCE OF TOTAL DRILLING COSTS BETWEEN CASED AND UNCASED WELLS IN SOFT ROCK AS A FUNCTION OF DEPTH AND DIAMETER

(in dollars)

Y_{TC} = Total drilling costs for cased wells;

Y_{TU} = Total drilling costs for uncased wells;

ϕ = Diameter of the hole drilled defined for uncased wells. For comparison, the diameter of the open hole of the cased well must be $\frac{3}{2}$ ϕ times as large.

$Y_{TC} - Y_{TU}$ (given ϕ = 10 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 11 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 12 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 13 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 14 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 15 in.)
11418.34	12855.47	16206.16	17712.48	21245.37	22820.87
22836.68	25710.95	32412.31	35424.95	42490.72	45641.72
34255.01	38566.42	48811.89	53971.98	65910.37	71335.48
49039.88	54916.11	69247.56	75426.07	90588.46	97069.25
61439.28	68784.57	86726.77	94449.90	113430.79	121531.77
74084.26	82898.61	104500.66	113768.42	136616.91	146338.09
86974.81	97258.21	122569.24	133381.64	160146.83	171488.21
100110.93	111863.40	140932.52	153289.53	184020.56	196982.13
113492.62	126714.15	159590.47	173492.12	208238.10	222819.87
127119.39	141810.47	178543.11	193989.39	232799.42	249001.40

$Y_{TC} - Y_{TU}$ (given ϕ = 16 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 17 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 18 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 19 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 20 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 21 in.)
26535.94	28180.64	32077.92	33791.79	37871.27	39654.33
53071.90	56361.27	65130.03	69177.54	78614.36	82838.55
83935.39	89625.52	102693.53	108007.54	121270.22	126810.94
113062.61	119845.67	136669.98	143755.32	161410.59	168798.21
141551.34	150030.18	171088.45	179945.13	202042.10	211276.62
170433.01	180607.60	205948.96	216576.98	243164.75	254246.19
199707.59	211577.95	241251.49	253650.85	284778.57	297706.90
229375.08	242941.21	276996.06	291166.75	326883.51	341658.74
259435.49	274697.39	313182.66	329124.68	369479.60	386101.75
289888.81	306846.48	349811.29	367524.65	412566.84	431035.90

Continued

$Y_{TC} - Y_{TU}$ (given ϕ = 22 in)	$Y_{TC} - Y_{TU}$ (given ϕ = 23 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 24 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 25 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 26 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 27 in.)
43916.01	46242.42	51732.33	54186.35	59896.76	62439.12
92716.38	97117.25	107436.10	112013.65	122406.33	126553.55
140696.83	146464.25	160973.37	166967.49	182099.82	188320.66
187284.43	194974.33	214291.50	222283.68	242431.81	250726.26
234412.29	244024.67	268199.00	278189.23	303402.28	313770.35
282080.40	293615.25	322695.90	334684.16	365011.25	377452.94
330288.77	343746.11	377782.17	391768.48	427258.71	441774.01
379037.42	394417.24	433457.80	449442.15	490144.66	506733.54
428326.32	445628.58	489722.82	507705.21	553669.09	572331.60
478155.49	497380.24	546577.21	566557.64	617832.00	638568.14

$Y_{TC} - Y_{TU}$ (given ϕ = 28 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 29 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 30 in.)
68370.05	71000.75	77152.18
137134.66	141433.03	152429.62
204076.20	210523.75	226902.51
271705.34	280302.08	302112.11
340022.09	350768.01	378058.44
409026.45	421921.55	454741.50
478718.40	493762.68	532161.25
549097.97	566291.44	610317.73
620165.13	639507.77	689210.94
689488.12	708932.91	760076.37

Table 26

DIFFERENCE OF TOTAL DRILLING COSTS BETWEEN CASED AND UNCASED WELLS IN MEDIUM SOFT ROCK AS A FUNCTION OF DEPTH AND DIAMETER

(in dollars)

Y_{TC} = Total drilling costs for cased wells;

Y_{TU} = Total drilling costs for uncased wells;

ϕ = Diameter of the hole drilled defined for uncased wells. For comparison, the diameter of the open hole of the cased well must be $\frac{3}{2}$ ϕ times as large.

$Y_{TC} - Y_{TU}$ (given ϕ = 10 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 11 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 12 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 13 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 14 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 15 in.)
11806.59	13257.69	16713.98	18237.07	21886.74	23481.81
23613.17	26515.39	33427.96	36474.14	43773.48	46963.61
35419.76	39773.08	50360.90	55658.49	68140.73	73730.87
51082.37	57057.07	71993.95	78290.63	94137.25	100755.90
64197.04	71665.42	90405.34	98276.18	118153.26	126426.58
77639.14	86601.19	109209.63	118654.65	142627.69	152555.65
91408.67	101864.40	128406.85	139426.03	167560.51	179143.14
105505.63	117455.03	147996.97	160590.32	192951.74	206189.03
119930.02	133373.10	167980.03	182147.54	218801.36	233693.32
134681.84	149618.60	188355.99	204097.68	245109.40	261656.02

$Y_{TC} - Y_{TU}$ (given ϕ = 16 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 17 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 18 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 19 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 20 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 21 in.)
27324.85	28991.90	33028.33	34767.36	38997.16	40808.17
54649.71	57983.81	67151.19	71329.07	81239.42	85612.35
86946.50	92829.20	106559.24	112006.18	125934.71	131623.13
117512.24	124452.86	142118.94	149381.52	167957.34	175541.90
147440.82	156116.60	178268.01	187346.25	210634.83	220115.53
177893.29	188304.22	215006.46	225900.35	253967.18	265344.02
208869.65	221015.73	252334.27	265043.82	297954.38	311227.37
240369.90	254251.14	290251.48	304776.66	342596.46	357765.58
272394.04	288010.43	328758.05	345098.88	387893.39	404958.66
304942.07	322293.62	367853.99	386010.48	433845.19	452806.58

Continued

$Y_{TC} - Y_{TU}$ (given ϕ = 22 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 23 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 24 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 25 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 26 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 27 in.)
45231.36	47629.78	53387.99	55926.55	61929.22	64565.29
96011.62	100579.57	111467.76	116230.77	127196.15	131471.38
146233.96	152163.86	167456.99	173628.37	189603.80	196016.66
195027.44	202933.98	223329.26	231557.76	252862.76	261413.25
244541.27	254424.44	279987.35	290272.99	316973.06	327661.16
294775.45	306635.25	337431.28	349774.04	381934.67	394760.39
345729.97	359566.41	395661.05	410060.93	447747.60	462710.93
397404.84	413217.91	454676.65	471133.66	514411.85	531512.81
449800.06	467589.77	514478.06	532992.23	581927.42	601165.98
502915.65	522681.97	575065.34	595636.60	650294.31	671670.49

$Y_{TC} - Y_{TU}$ (given ϕ = 28 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 29 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 30 in.)
70812.41	73546.01	80037.59
142637.58	147073.81	158694.87
212674.38	219328.72	236668.75
283627.98	292500.44	315624.91
355498.40	366588.96	395563.36
428285.61	441594.29	476484.12
501989.64	517516.42	558387.16
576610.47	594355.38	641272.47
652148.09	672111.11	725140.06
725515.94	745094.19	798839.40

Table 27

DIFFERENCE OF TOTAL DRILLING COSTS BETWEEN CASED AND UNCASED WELLS IN MEDIUM HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} = Total drilling costs for cased wells;

Y_{TU} = Total drilling costs for uncased wells;

ϕ = Diameter of the hole drilled defined for uncased wells. For comparison, the diameter of the open hole of the cased well must be $\frac{3}{2}$ ϕ times as large.

$Y_{TC} - Y_{TU}$ (given ϕ = 10 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 11 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 12 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 13 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 14 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 15 in.)
12241.25	13706.33	17277.51	18817.37	22593.10	24207.74
24482.51	27412.68	34555.02	37634.74	45186.22	48415.48
36723.75	41119.01	52082.58	57536.61	70632.63	76410.92
53416.96	59499.39	75118.63	81544.58	98159.75	104929.21
67364.41	74967.45	94610.15	102642.58	123530.17	131992.00
81738.94	90862.59	114614.16	124253.07	149498.52	159652.71
96540.55	107184.80	135130.67	146376.07	176064.78	187911.34
111769.26	123934.11	156159.67	169011.57	203228.96	216767.88
127425.04	141110.51	177701.19	192159.56	230991.05	246222.35
143507.90	158713.97	199755.19	215820.06	259351.06	276274.72

$Y_{TC} - Y_{TU}$ (given ϕ = 16 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 17 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 18 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 19 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 20 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 21 in.)
28188.03	29877.45	34062.30	35826.49	40215.91	42054.87
56376.08	59754.89	69365.62	73691.28	84131.31	88673.15
90320.51	96423.06	110896.15	116488.53	131157.48	137007.48
122540.28	129653.26	148260.24	155716.74	175319.63	183119.64
154124.49	163015.71	186393.08	195713.70	220335.96	230085.[illegible]7
186392.02	197061.49	225294.66	236479.41	266206.45	277905.48
219342.89	231790.60	264965.00	278013.87	312931.10	326581.13
252977.09	267203.05	305404.08	320317.08	360509.94	376109.95
287294.63	303298.82	346611.92	363389.05	408942.93	426492.95
322295.50	340077.95	388588.51	407229.76	458230.09	477730.11

Continued

$Y_{TC} - Y_{TU}$ (given ϕ = 22 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 23 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 24 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 25 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 26 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 27 in.)
46648.85	49128.23	55184.81	57818.99	64146.76	66889.03
99655.56	104413.57	115938.35	120912.54	132513.76	136929.03
152423.37	158531.01	174693.83	181059.11	197968.86	204591.78
203718.46	211861.98	233456.70	241943.75	264534.38	273364.94
255953.13	266132.54	293244.58	303853.38	332210.31	343248.52
309127.38	321342.68	354057.46	366788.02	400996.67	414242.51
363241.21	377492.40	415895.31	430747.65	470893.44	486346.91
418294.64	434581.69	478758.21	495732.29	541900.64	559561.75
474287.64	492610.59	542646.08	561741.95	614018.23	633886.99
531220.24	551579.05	607558.96	628776.58	687246.23	709322.66

$Y_{TC} - Y_{TU}$ (given ϕ = 28 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 29 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 30 in.)
73487.97	76338.33	83208.46
148741.27	153328.31	165638.51
222248.46	229129.02	247532.64
296951.48	306125.56	330708.02
372850.34	384317.95	415164.64
449945.03	463706.14	500902.53
528235.54	544290.19	587921.66
607721.91	626070.05	676222.03
688404.10	709045.76	765803.72
766398.21	786053.96	842611.10

Table 28

DIFFERENCE OF TOTAL DRILLING COSTS BETWEEN CASED AND UNCASED WELLS IN HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER (in dollars)

Y_{TC} = Total drilling costs for cased wells;

Y_{TU} = Total drilling costs for uncased wells;

ϕ = Diameter of the hole drilled defined for uncased wells. For comparison, the diameter of the open hole of the cased well must be $\frac{3}{2}$ ϕ times as large.

$Y_{TC} - Y_{TU}$ (given ϕ = 10 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 11 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 12 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 13 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 14 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 15 in.)
13447.68	14940.72	18809.08	20382.48	24477.77	26131.54
26895.36	29881.44	37618.17	40764.98	48955.55	52263.08
40343.04	44822.16	56779.80	62684.34	77515.65	83838.10
60207.26	66572.34	84114.93	90880.05	109644.67	116809.83
76673.60	84629.94	106841.09	115297.49	139036.17	147992.63
93895.55	103443.16	130473.98	140621.66	169485.53	180233.27
111873.11	123011.98	155013.60	166852.56	200992.73	213531.76
130606.27	143336.42	180459.96	193990.19	233557.79	247888.11
150095.05	164416.46	206813.04	222034.55	267180.70	283302.31
170339.44	186252.12	234072.85	250985.64	301861.46	319774 36

$Y_{TC} - Y_{TU}$ (given ϕ = 16 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 17 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 18 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 19 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 20 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 21 in.)
30453.76	32187.89	36737.03	38551.52	43327.59	45222.45
60907.51	64375.78	75198.00	79945.58	91852.74	96878.93
99703.82	106444.17	122991.72	128965.67	145656.92	151930.89
136796.49	144361.69	165570.37	173535.62	195966.32	204331.62
173258.85	182715.35	209509.10	219465.67	247786.96	258243.57
210930.17	222277.98	254807.93	266755.80	301118.80	313666.76
249810.48	263049.59	301466.86	315406.06	355961.86	370601.12
289899.75	305030.18	349485.88	365416.38	412316.14	429046.73
331198.01	348219.74	398865.00	416786.82	470181.63	489003.56
373705.26	392618.26	449604.22	469517.35	529558.37	550471.59

Continued

$Y_{TC} - Y_{TU}$ (given ϕ = 22 in)	$Y_{TC} - Y_{TU}$ (given ϕ = 23 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 24 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 25 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 26 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 27 in.)
50225.43	52931.89	59803.54	62709.48	69925.94	72971.18
109475.68	114780.49	128066.84	133650.25	146981.54	151764.26
169538.65	176112.66	194636.95	201510.99	220951.79	228125.87
227984.35	236749.70	261624.45	270789.84	296886.62	306452.05
288092.39	299049.07	330425.41	341882.16	374786.04	386742.83
349862.77	363010.79	401039.85	414787.93	454650.04	468998.18
413295.48	428634.83	473467.73	489507.18	536478.63	553218.13
478390.55	495921.23	547709.10	566039.86	620271.79	639402.63
545147.93	564869.96	623763.89	644386.02	706029.48	727551.74
613567.66	635481.05	701632.15	724545.63	793751.86	817665.40

$Y_{TC} - Y_{TU}$ (given ϕ = 28 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 29 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 30 in.)
80532.43	83716.98	91623.03
165311.22	170293.96	184451.93
248483.19	255957.31	277231.16
333770.87	343736.35	372277.18
421174.25	433631.10	469590.05
510693.32	525641.55	569169.74
602328.12	619767.72	671016.28
696078.59	716009.62	775129.61
791944.85	814367.16	881509.79
883414.62	902818.20	966524.76

Table 29

DIFFERENCE OF TOTAL DRILLING COSTS BETWEEN CASED AND UNCASED WELLS IN VERY HARD ROCK AS A FUNCTION OF DEPTH AND DIAMETER
(in dollars)

Y_{TC} = Total drilling costs for cased wells;

Y_{TU} = Total drilling costs for uncased wells;

ϕ = Diameter of the hole drilled defined for uncased wells. For comparison, the diameter of the open hole of the cased well must be $\frac{3}{2}$ ϕ times as large.

$Y_{TC} - Y_{TU}$ (given ϕ = 10 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 11 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 12 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 13 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 14 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 15 in.)
14388.43	15909.43	20021.85	21628.79	25990.50	27683.40
28776.86	31818.85	40043.69	43257.58	51981.00	55366.80
43165.30	47728.28	60488.81	66735.40	82901.83	89636.14
65325.84	71920.59	90946.28	97987.01	118418.48	125905.19
83638.53	91881.97	116060.32	124861.24	150796.81	160155.22
102933.50	112825.64	142353.11	152914.22	184550.36	195780.44
123210.77	134751.60	169824.66	182145.95	219679.11	232780.88
144470.34	157659.85	198474.95	212556.43	256183.08	271156.51
166712.19	181550.40	228303.99	244145.65	294062.25	310907.38
189936.34	206423.24	259311.78	276913.63	333316.63	352033.44

$Y_{TC} - Y_{TU}$ (given ϕ = 16 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 17 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 18 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 19 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 20 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 21 in.)
32294.39	34073.25	38933.53	40798.34	45907.90	47858.67
64588.78	68146.49	79924.21	84994.13	98047.05	103442.11
107010.16	114232.20	132390.51	138674.52	156961.32	163579.32
147742.42	155675.12	178918.13	187296.82	211945.60	220770.27
187848.00	197763.88	227213.88	237687.25	268894.46	279925.29
229525.23	241424.29	277277.75	289845.77	327807.90	341044.91
272774.14	286656.37	329109.74	343772.45	388685.92	404129.09
317594.72	333460.12	382709.87	399467.24	451528.54	469177.87
363986.94	381835.54	438078.12	456930.17	516335.72	536191.22
411950.86	431782.63	495214.47	516161.21	583107.56	605169.17

Continued

$Y_{TC} - Y_{TU}$ (given ϕ = 22 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 23 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 24 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 25 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 26 in.)	$Y_{TC} - Y_{TU}$ (given = ϕ 27 in.)
53217.52	56099.71	63614.36	66728.62	74645.78	77922.61
117300.08	123020.29	137683.30	143728.66	158428.75	163510.06
182920.95	189873.95	210269.40	217556.88	239006.67	246628.62
246824.83	256095.47	283555.80	293272.43	322138.54	332301.15
312889.73	324478.04	359199.70	371345.50	407824.37	420527.63
381115.68	395021.67	437201.11	451776.05	496064.15	511308.08
451502.65	467726.31	517560.00	534564.12	586857.90	604642.49
524050.71	542592.02	600276.40	619709.64	680205.60	700530.85
598759.75	619618.73	685350.37	707212.76	776107.22	798973.14
675629.95	698806.52	772781.68	797073.27	874562.87	899969.41

$Y_{TC} - Y_{TU}$ (given ϕ = 28 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 29 in.)	$Y_{TC} - Y_{TU}$ (given ϕ = 30 in.)
86242.31	89681.71	98403.92
178442.88	183747.18	199382.88
269132.75	277089.19	300647.65
362573.03	373181.64	404859.28
458763.74	472024.48	512017.79
557704.84	573617.75	622123.17
659396.42	677961.47	735175.43
763838.29	785055.51	851174.51
871030.74	894900.00	970120.50
972647.90	992120.04	1061773.70

Table 30

MARGINAL DRILLING COSTS FOR

CASED WELLS IN SOFT ROCK

AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$Y_{MC} = Y_{TC}(\phi+1) - Y_{TC}(\phi)$

Where:

Y_{MC} = Marginal drilling costs;

$Y_{TC}(\phi+1)$ = Total drilling costs for cased wells in soft rock at a diameter of $\phi+1$;

$Y_{TC}(\phi)$ = Total drilling cost for cased wells in soft rock at a diameter ϕ;

ϕ = Diameter of hole drilled ranging from 10 to 44 inches.

Y_{MC} (given ϕ = 10 in.)	Y_{MC} (given ϕ = 11 in.)	Y_{MC} (given ϕ = 12 in.)	Y_{MC} (given ϕ = 13 in.)	Y_{MC} (given ϕ = 14 in.)	Y_{MC} (given ϕ = 15 in.)
1634.09	1671.77	1709.43	1747.11	1784.78	1822.45
3268.19	3343.53	3418.88	3494.21	3569.56	3644.91
4902.28	5015.30	5128.31	5241.32	5354.34	5467.36
7158.60	7334.83	7511.05	7687.28	7863.50	8039.73
8976.14	9196.42	9416.70	9636.98	9857.27	10077.55
10842.79	11107.12	11371.47	11635.80	11900.15	12164.48
12758.55	13066.95	13375.34	13683.75	13992.13	14300.53
14723.43	15075.89	15428.33	15780.80	16133.24	16485.69
16737.43	17133.94	17530.44	17926.96	18323.46	18719.97
18800.53	19241.11	19681.67	20122.23	20562.80	21003.36

Y_{MC} (given ϕ = 16 in.)	Y_{MC} (given ϕ = 17 in.)	Y_{MC} (given ϕ = 18 in.)	Y_{MC} (given ϕ = 19 in.)	Y_{MC} (given ϕ = 20 in.)	Y_{MC} (given ϕ = 21 in.)
1860.13	1897.79	1935.47	1973.14	2010.81	2048.48
3720.24	3795.59	3870.93	3946.28	4021.62	4096.96
5580.37	5886.80	6447.53	6579.71	6711.87	6844.05
8215.96	8392.18	8568.41	8744.63	8920.86	9097.09
10297.83	10518.12	10738.39	10958.69	11178.96	11399.24
12428.82	12693.16	12957.50	13221.84	13486.18	13750.52
14608.93	14917.32	15225.72	15534.11	15842.51	16150.90
16838.15	17190.60	17543.04	17895.51	18247.95	18600.40
19116.48	19512.99	19909.50	20306.00	20702.52	21099.02
21443.93	21884.49	22325.36	22765.63	23206.18	23646.76

Continued

Y_{MC} (given ϕ = 22 in.)	Y_{MC} (given ϕ = 23 in.)	Y_{MC} (given ϕ = 24 in.)	Y_{MC} (given ϕ = 25 in.)	Y_{MC} (given ϕ = 26 in.)	Y_{MC} (given ϕ = 27 in.)
2086.15	2123.82	2161.50	2199.17	2236.84	2274.51
4172.31	4247.65	4322.99	4765.53	5080.68	5168.79
6976.21	7108.38	7240.55	7372.72	7504.89	7637.06
9273.31	9449.54	9625.76	9801.99	9978.22	10154.44
11619.53	11839.80	12060.10	12280.37	12500.66	12720.94
14014.85	14279.20	14543.53	14807.87	15072.22	15336.56
16459.31	16767.69	17076.09	17384.49	17692.88	18001.28
18952.87	19305.31	19657.76	20010.21	20362.67	20715.12
21495.53	21892.04	22288.55	22685.05	23081.57	23478.07
24087.32	24527.88	24968.45	25409.01	25849.58	26290.15

Y_{MC} (given ϕ = 28 in.)	Y_{MC} (given ϕ = 29 in.)	Y_{MC} (given ϕ = 30 in.)	Y_{MC} (given ϕ = 31 in.)	Y_{MC} (given ϕ = 32 in.)	Y_{MC} (given ϕ = 33 in.)
2312.18	2349.85	2387.53	2425.20	2462.87	2974.71
5256.90	5345.02	5433.13	5521.24	5609.36	5697.47
7769.23	7901.40	8033.57	8165.74	8297.91	8430.07
10330.67	10506.90	10683.12	10859.34	11035.58	11211.80
12941.22	13161.51	13381.78	13602.07	13822.36	14042.64
15600.88	15865.23	16129.57	16393.90	16658.25	16922.59
18309.66	18618.09	18926.46	19234.85	19543.25	19851.66
21067.56	21420.03	21772.47	22124.93	22477.38	22829.84
23874.58	24271.10	24667.60	25064.10	25460.62	25857.13
26730.70	27171.28	27611.84	28052.40	28492.98	28933.55

Y_{MC} (given ϕ = 34 in.)	Y_{MC} (given ϕ = 35 in.)	Y_{MC} (given ϕ = 36 in.)	Y_{MC} (given ϕ = 37 in.)	Y_{MC} (given ϕ = 38 in.)	Y_{MC} (given ϕ = 39 in.)
3058.03	3102.09	3146.15	3190.20	3234.26	3278.32
5785.58	5873.70	5961.81	6049.92	6138.04	6226.15
8562.25	8694.42	8826.58	8958.75	9090.93	9223.10
11388.02	11564.25	11740.48	11916.70	12092.93	12269.15
14262.90	14483.20	14703.49	14923.76	15144.05	15364.33
17186.93	17451.26	17715.60	17979.94	18244.28	18508.63
20160.04	20468.45	20776.83	21085.23	21393.64	21702.03
23182.27	23534.73	23887.19	24239.63	24592.10	24944.52
26253.64	26650.15	27046.65	27443.15	27839.67	28236.18
29374.08	29814.67	30255.23	30695.79	31136.36	31576.92

Y_{MC} (given ϕ = 40 in.)	Y_{MC} (given ϕ = 41 in.)	Y_{MC} (given ϕ = 42 in.)	Y_{MC} (given ϕ = 43 in.)	Y_{MC} (given ϕ = 44 in.)
3322.37	3366.43	3410.49	3454.54	3498.60
6314.26	6402.37	6490.49	6578.60	6666.71
9355.26	9487.43	9619.60	9751.78	9883.94
12445.38	12621.61	12797.84	12974.05	13150.28
15584.61	15804.90	16025.18	16245.46	16465.74
18772.95	19037.30	19301.63	19565.98	19830.32
22010.41	22318.82	22627.21	22935.60	23244.00
25297.00	25649.46	26001.91	26354.34	26706.80
28632.69	29029.20	29425.70	29822.21	30218.72
31568.89	30474.88	30851.58	31228.30	31604.97

Table 31

MARGINAL DRILLING COSTS FOR

CASED WELLS IN MEDIUM SOFT ROCK

AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH

(in dollars)

$$Y_{MC} = Y_{TC}(\phi+1) - Y_{TC}(\phi)$$

Where:

Y_{MC} = Marginal drilling costs;

$Y_{TC}(\phi+1)$ = Total drilling costs for cased wells in medium soft rock at a diameter of $\phi+1$;

$Y_{TC}(\phi)$ = Total drilling cost for cased wells in medium soft rock at a diameter ϕ;

ϕ = Diameter of hole drilled ranging from 10 to 44 inches.

Y_{MC} (given ϕ = 10 in.)	Y_{MC} (given ϕ = 11 in.)	Y_{MC} (given ϕ = 12 in.)	Y_{MC} (given ϕ = 13 in.)	Y_{MC} (given ϕ = 14 in.)	Y_{MC} (given ϕ = 15 in.)
1706.15	1746.62	1787.09	1827.55	1868.02	1908.48
3412.30	3493.24	3574.17	3655.11	3736.04	3816.97
5118.46	5239.85	5361.26	5482.66	5604.06	5725.45
7527.71	7723.63	7919.55	8115.47	8311.39	8507.31
9478.46	9723.35	9968.25	10213.15	10458.06	10702.95
11494.68	11788.56	12082 44	12376.33	12670.20	12964.08
13576.40	13919.25	14262.12	14604.98	14947.84	15290.69
15723.60	16115.43	16507.28	16899.12	17290.96	17682.79
17936.29	18377.10	18817.93	19258.74	19699.57	20140.38
20214.45	20704.26	21194 06	21683.86	22173.66	22663.46

Y_{MC} (given ϕ = 16 in.)	Y_{MC} (given ϕ = 17 in.)	Y_{MC} (given ϕ = 18 in.)	Y_{MC} (given ϕ = 19 in.)	Y_{MC} (given ϕ = 20 in.)	Y_{MC} (given ϕ = 21 in.)
1948.96	1989.42	2029.88	2070.36	2110.82	2151.29
3897.91	3978.84	4059.77	4140.71	4221.64	4302.57
5846.86	6187.22	6817.98	6964.91	7111.86	7258.79
8703.23	8899.15	9095.07	9290.99	9486.92	9682.83
10947.86	11192.75	11437.65	11682.56	11927.45	12172.36
13257.96	13551.84	13845.73	14139.61	14433.48	14727.36
15633.56	15976.42	16319.28	16662.14	17005.00	17347.86
18074.64	18466.48	18858.32	19250.17	19642.00	20033.84
20581.21	21022.03	21462.34	21903.67	22344.49	22785.31
23153.26	23643 06	24132.86	24622.66	25112.47	25602.26

Continued

Y_{MC} (given ϕ = 22 in.)	Y_{MC} (given ϕ = 23 in.)	Y_{MC} (given ϕ = 24 in.)	Y_{MC} (given ϕ = 25 in.)	Y_{MC} (given ϕ = 26 in.)	Y_{MC} (given ϕ = 27 in.)
2191.75	2232.22	2272.69	2313.16	2353.62	2394.09
4383.51	4464.45	4545.37	5038.03	5390.05	5488.00
7405.74	7552.67	7699.62	7846.55	7993.50	8140.43
9878.75	10074.67	10270.60	10466.50	10662.44	10858.35
12417.25	12662.16	12907.06	13151.95	13396.86	13641.76
15021.25	15315.12	15609.01	15902.88	16196.77	16490.65
17690.72	18033.58	18376.44	18719.30	19062.16	19405.03
20425.68	20817.52	21209.37	21601.19	21993.06	22384.88
23226.13	23666.95	24107.77	24548.59	24989.42	25430.23
26092.07	26581.86	27071.67	27561.45	28051.27	28541.08

Y_{MC} (given ϕ = 28 in.)	Y_{MC} (given ϕ = 29 in.)	Y_{MC} (given ϕ = 30 in.)	Y_{MC} (given ϕ = 31 in.)	Y_{MC} (given ϕ = 32 in.)	Y_{MC} (given ϕ = 33 in.)
2434.55	2475.02	2515.49	2555.96	2596.42	3152.32
5585.96	5683.93	5781.89	5879.84	5977.81	6075.76
8287.38	8434.31	8581.26	8728.19	8875.14	9022.08
11054.28	11250.19	11446.11	11642.04	11837.95	12033.88
13886.65	14131.56	14376.46	14621 35	14866.26	15111.16
16784.52	17078.41	17372.29	17666.16	17960.05	18253.93
19747.88	20090.74	20433.61	20776.46	21119.32	21462.19
22776.71	23168.58	23560.40	23952.25	24344.08	24735.93
25871.05	26311.88	26752.70	27193.50	27634.34	28075.16
29030.85	29520.68	30010.46	30500.27	30990.09	31479.86

Y_{MC} (given ϕ = 34 in.)	Y_{MC} (given ϕ = 35 in.)	Y_{MC} (given ϕ = 36 in.)	Y_{MC} (given ϕ = 37 in.)	Y_{MC} (given ϕ = 38 in.)	Y_{MC} (given ϕ = 39 in.)
3243.92	3292.90	3341.88	3390.85	3439.85	3488.82
6173.73	6271.68	6369.65	6467.60	6565.57	6663.52
9169.02	9315.95	9462.90	9609.84	9756.78	9903.72
12229.79	12425.72	12621.63	12817.56	13013.47	13209.40
15356.06	15600.96	15845.86	16090.75	16335.67	16580.56
18547.81	18841.69	19135.57	19429.45	19723.33	20017.21
21805.04	22147.91	22490.76	22833.63	23176.50	23519.34
25127.77	25519.61	25911.45	26303.28	26695.13	27086.98
28515.98	28956.78	29397.64	29838.41	30279.27	30720.07
31969.66	32459.48	32949.27	33439.06	33928.89	34418.66

Y_{MC} (given ϕ = 40 in.)	Y_{MC} (given ϕ = 41 in.)	Y_{MC} (given ϕ = 42 in.)	Y_{MC} (given ϕ = 43 in.)	Y_{MC} (given ϕ = 44 in.)
3537.79	3586.78	3635.77	3684.73	3733.72
6761.49	6859.44	6957.41	7055.37	7153.32
10050.65	10197.60	10344.54	10491.48	10638.42
13405.32	13601.23	13797.16	13993.07	14189.00
16825.46	17070.36	17315.26	17560.17	17805.05
20311.09	20604.97	20898.85	21192.73	21486.62
23862.21	24205.07	24547.93	24890.79	25233.66
27478.80	27870.66	28262.49	28654.32	29046.16
31160.90	31601.72	32042.55	32483.36	32924.14
34339.56	32880.60	33285.20	33689.89	34094.50

Table 32

MARGINAL DRILLING COSTS FOR

CASED WELLS IN MEDIUM HARD ROCK

AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH

(in dollars)

$Y_{MC} = Y_{TC}(\phi+1) - Y_{TC}(\phi)$

Where:

Y_{MC} = Marginal drilling costs;

$Y_{TC}(\phi+1)$ = Total drilling costs for cased wells in medium hard rock at a diameter of $\phi+1$;

$Y_{TC}(\phi)$ = Total drilling cost for cased wells in medium hard rock at a diameter ϕ;

ϕ = Diameter of hole drilled ranging from 10 to 44 inches.

Y_{MC} (given ϕ = 10 in.)	Y_{MC} (given ϕ = 11 in.)	Y_{MC} (given ϕ = 12 in.)	Y_{MC} (given ϕ = 13 in.)	Y_{MC} (given ϕ = 14 in.)	Y_{MC} (given ϕ = 15 in.)
1787.50	1830.75	1874.02	1917.28	1960.55	2003.80
3574.99	3661.52	3748.04	3834.56	3921.09	4007.61
5362.48	5492.27	5622.06	5751.84	5881.63	6011.42
7951.53	8169.01	8386.47	8603.93	8821.40	9038.86
10058.06	10329.90	10601.73	10873.55	11145.39	11417.23
12250.01	12576.20	12902.41	13228.60	13554.79	13881.00
14527.37	14907.93	15288.50	15669.05	16049.62	16430.19
16890.15	17325.07	17760.00	18194.94	18629.86	19064.79
19338.33	19827.63	20316.93	20806.23	21295.52	21784.82
21871.94	22415.61	22959.27	23502.93	24046.60	24590.26

Y_{MC} (given ϕ = 16 in.)	Y_{MC} (given ϕ = 17 in.)	Y_{MC} (given ϕ = 18 in.)	Y_{MC} (given ϕ = 19 in.)	Y_{MC} (given ϕ = 20 in.)	Y_{MC} (given ϕ = 21 in.)
2047.07	2090.33	2133.59	2176.86	2220.11	2263.38
4094.13	4180.66	4267.18	4353.71	4440.24	4526.75
6141.20	6521.04	7235.22	7398.32	7561.41	7724.52
9256.33	9473.79	9691.26	9908.73	10126.19	10343.65
11689.05	11960.88	12232.72	12504.54	12776.38	13048.21
14207.19	14533.39	14859.59	15185.79	15511.98	15838.18
16810.75	17191.32	17571.87	17952.45	18333.00	18713.57
19499.73	19934.65	20369.59	20804.51	21239.45	21674.37
22274.12	22763.41	23252.70	23742.01	24231.29	24720.61
25133.92	25677.58	26221.25	26764.91	27308.58	27852.23

Continued

Y_{MC} (given ϕ = 22 in.)	Y_{MC} (given ϕ = 23 in.)	Y_{MC} (given ϕ = 24 in.)	Y_{MC} (given ϕ = 25 in.)	Y_{MC} (given ϕ = 26 in.)	Y_{MC} (given ϕ = 27 in.)
2306.64	2349.90	2393.17	2436.42	2479.69	2522.95
4613.28	4699.81	4786.32	5338.79	5734.46	5843.19
7887.62	8050.71	8213.81	8376.91	8540.01	8703.11
10561.12	10778.59	10996.05	11213.51	11430.98	11648.45
13320.04	13591.88	13863.70	14135.53	14407.37	14679.20
16164.38	16490.58	16816.78	17142.96	17469.17	17795.37
19094.14	19474.69	19855.27	20235.82	20616.39	20996.96
22109.31	22544.23	22979.17	23414.09	23849.03	24283.96
25209.89	25699.19	26188.48	26677.78	27167.09	27656.38
28395.90	28939.56	29483.23	30026.89	30570.55	31114.21

Y_{MC} (given ϕ = 28 in.)	Y_{MC} (given ϕ = 29 in.)	Y_{MC} (given ϕ = 30 in.)	Y_{MC} (given ϕ = 31 in.)	Y_{MC} (given ϕ = 32 in.)	Y_{MC} (given ϕ = 33 in.)
2566.22	2609.47	2652.74	2696.00	2739.26	3348.17
5951.92	6060.65	6169.39	6278.12	6386.85	6495.59
8866.21	9029.31	9192.40	9355.50	9518.61	9681.70
11865.90	12083.38	12300.84	12518.30	12735.78	12953.23
14951.02	15222.87	15494.69	15766.52	16038.36	16310.19
18121.56	18447.77	18773.97	19100.14	19426.36	19752.56
21377.51	21758.08	22138.65	22519.21	22899.77	23280.34
24718.88	25153.83	25588.73	26023.68	26458.61	26893.54
28145.66	28634.98	29124.27	29613.55	30102.86	30592.16
31657.86	32201.55	32745.20	33288.87	33832.53	34376.17

Y_{MC} (given ϕ = 34 in.)	Y_{MC} (given ϕ = 35 in.)	Y_{MC} (given ϕ = 36 in.)	Y_{MC} (given ϕ = 37 in.)	Y_{MC} (given ϕ = 38 in.)	Y_{MC} (given ϕ = 39 in.)
3449.25	3503.62	3557.98	3612.35	3666.72	3721.08
6604.31	6713.05	6821.79	6930.51	7039.25	7147.97
9844.80	10007.90	10171.00	10334.09	10497.20	10660.29
13170.70	13388.17	13605.63	13823.09	14040.57	14258.02
16582.01	16853.85	17125.68	17397.51	17669.34	17941.18
20078.75	20404.95	20731.14	21057.34	21383.55	21709.73
23660.91	24041.45	24422.03	24802.60	25183.16	25563.70
27328.48	27763.40	28198.33	28633.26	29068.20	29503.12
31081.45	31570.75	32060.05	32549.33	33038.63	33527.95
34919.84	35463.53	36007.18	36550.82	37094.50	37638.20

Y_{MC} (given ϕ = 40 in.)	Y_{MC} (given ϕ = 41 in.)	Y_{MC} (given ϕ = 42 in.)	Y_{MC} (given ϕ = 43 in.)	Y_{MC} (given ϕ = 44 in.)
3775.45	3829.81	3884.18	3938.55	3992.91
7256.72	7365.44	7474.18	7582.91	7691.64
10823.40	10986.49	11149.59	11312.69	11475.79
14475.49	14692.96	14910.42	15127.89	15345.35
18213.01	18484.84	18756.67	19028.50	19300.32
22035.95	22362.13	22688.34	23014.52	23340.74
25944.30	26324.84	26705.42	27085.97	27466.54
29938.05	30372.98	30807.91	31242.84	31677.77
34017.23	34506.54	34995.80	35485.10	35974.50
37466.41	35557.00	35989.70	36422.30	36854.91

Table 33

MARGINAL DRILLING COSTS FOR

CASED WELLS IN HARD ROCK

AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH

(in dollars)

$$Y_{MC} = Y_{TC}(\phi+1) - Y_{TC}(\phi)$$

Where:

Y_{MC} = Marginal drilling costs;

$Y_{TC}(\phi+1)$ = Total drilling costs for cased wells in hard rock at a diameter of $\phi+1$;

$Y_{TC}(\phi)$ = Total drilling cost for cased wells in in hard rock at a diameter ϕ;

ϕ = Diameter of hole drilled ranging from 10 to 44 inches.

Y_{MC} (given ϕ = 10 in.)	Y_{MC} (given ϕ = 11 in.)	Y_{MC} (given ϕ = 12 in.)	Y_{MC} (given ϕ = 13 in.)	Y_{MC} (given ϕ = 14 in.)	Y_{MC} (given ϕ = 15 in.)
2017.60	2066.45	2115.31	2164.16	2213.01	2261.86
4035.20	4132.91	4230.61	4328.31	4426.02	4523.73
6052.80	6199.36	6345.92	6492.47	6639.03	6785.59
9196.54	9470.53	9744.53	10018.52	10292.52	10566.51
11778.58	12121.07	12463.57	12806.05	13148.55	13491.05
14511.74	14922.74	15333.72	15744.72	16155.70	16566.70
17396.03	17875.51	18355.00	18834.50	19313.98	19793.47
20431.43	20979.42	21527.40	22075.40	22623.38	23171.37
23617.96	24234.44	24850.93	25467.42	26083.90	26700.39
26955.61	27640.59	28325.57	29010.57	29695.55	30380.53

Y_{MC} (given ϕ = 16 in.)	Y_{MC} (given ϕ = 17 in.)	Y_{MC} (given ϕ = 18 in.)	Y_{MC} (given ϕ = 19 in.)	Y_{MC} (given ϕ = 20 in.)	Y_{MC} (given ϕ = 21 in.)
2310.72	2359.56	2408.42	2457.28	2506.12	2554.98
4621.43	4719.14	4816.84	4914.55	5012.25	5109.95
6932.15	7431.25	8409.59	8615.08	8820.57	9026.08
10840.50	11114.50	11388.49	11662.49	11936.48	12210.47
13833.53	14176.03	14518.52	14861.01	15203.50	15546.00
16977.68	17388.68	17799.67	18210.66	18621.65	19032.64
20272.96	20752.45	21231.94	21711.43	22190.92	22670.40
23719.36	24267.34	24815.33	25363.32	25911.31	26459.29
27316.88	27933.35	28549.85	29166.33	29782.83	30399.30
31065.51	31750.49	32435.48	33120.48	33805.45	34490.43

Continued

Y_{MC} (given ϕ = 22 in.)	Y_{MC} (given ϕ = 23 in.)	Y_{MC} (given ϕ = 24 in.)	Y_{MC} (given ϕ = 25 in.)	Y_{MC} (given ϕ = 26 in.)	Y_{MC} (given ϕ = 27 in.)
2603.83	2652.69	2701.53	2750.39	2799.25	2848.09
5207.67	5305.37	5403.07	6145.43	6677.78	6814.77
9231.56	9437.07	9642.55	9848.06	10053.54	10259.05
12484.47	12758.46	13032.45	13306.45	13580.44	13854.44
15888.49	16230.98	16573.47	16915.96	17258.46	17600.95
19443.63	19854.62	20265.61	20676.60	21087.60	21498.58
23149.90	23629.38	24108.88	24588.36	25067.86	25547.34
27007.29	27555.26	28103.27	28651.24	29199.23	29747.22
31015.79	31632.27	32248.78	32865.23	33481.74	34098.22
35175.45	35860.40	36545.38	37230.38	37915.36	38600.34

Y_{MC} (given ϕ = 28 in.)	Y_{MC} (given ϕ = 29 in.)	Y_{MC} (given ϕ = 30 in.)	Y_{MC} (given ϕ = 31 in.)	Y_{MC} (given ϕ = 32 in.)	Y_{MC} (given ϕ = 33 in.)
2896.95	2945.80	2994.65	3043.50	3092.36	3872.44
6951.77	7088.77	7225.76	7362.77	7499.75	7636.76
10464.54	10670.04	10875.53	11081.02	11286.52	11492.02
14128.42	14402.43	14676.42	14950.41	15224.40	15498.41
17943.44	18285.94	18628.42	18970.92	19313.41	19655.90
21909.58	22320.57	22731.56	23142.54	23553.54	23964.52
26026.82	26506.32	26985.80	27465.30	27944.79	28424.27
30295.21	30843.20	31391.18	31939.18	32487.15	33035.15
34714.71	35331.19	35947.70	36564.15	37180.65	37797.14
39285.31	39970.34	40655.27	41340.30	42025.25	42710.29

Y_{MC} (given ϕ = 34 in.)	Y_{MC} (given ϕ = 35 in.)	Y_{MC} (given ϕ = 36 in.)	Y_{MC} (given ϕ = 37 in.)	Y_{MC} (given ϕ = 38 in.)	Y_{MC} (given ϕ = 39 in.)
4001.11	4069.62	4138.11	4206.61	4275.11	4343.61
7773.75	7910.75	8047.75	8184.74	8321.74	8458.74
11697.51	11903.01	12108.50	12314.00	12519.49	12724.99
15772.39	16046.38	16320.38	16594.37	16868.37	17142.36
19998.39	20340.89	20683.39	21025.86	21368.37	21710.85
24375.52	24786.52	25197.50	25608.49	26019.48	26430.48
28903.77	29383.25	29862.76	30342.22	30821.73	31301.20
33583.13	34131.13	34679.10	35227.10	35775.09	36323.04
38413.63	39030.09	39646.60	40263.10	40879.50	41496.09
43395.20	44080.20	44765.20	45450.20	46135.19	46820.11

Y_{MC} (given ϕ = 40 in.)	Y_{MC} (given ϕ = 41 in.)	Y_{MC} (given ϕ = 42 in.)	Y_{MC} (given ϕ = 43 in.)	Y_{MC} (given ϕ = 44 in.)
4412.10	4480.61	4549.10	4617.60	4686.10
8595.73	8732.73	8869.73	9006.72	9143.72
12930.48	13135.98	13341.48	13546.96	13752.48
17416.35	17690.36	17964.34	18238.33	18512.33
22053.35	22395.84	22738.34	23080.83	23423.31
26841.47	27252.44	27663.45	28074.43	28485.44
31780.70	32260.18	32739.69	33219.16	33698.68
36871.10	37418.99	37967.11	38515.00	39063.00
42112.61	42729.00	43345.50	43962.00	44578.50
46306.80	42876.41	43365.00	43853.39	44342.00

Table 34

MARGINAL DRILLING COSTS FOR CASED WELLS IN VERY HARD ROCK AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH

(in dollars)

$$Y_{MC} = Y_{TC}(\phi+1) - Y_{TC}(\phi)$$

Where:

Y_{MC} = Marginal drilling costs;

$Y_{TC}(\phi+1)$ = Total drilling costs for cased wells in very hard rock at a diameter of $\phi+1$;

$Y_{TC}(\phi)$ = Total drilling cost for cased wells in very hard rock at a diameter ϕ;

ϕ = Diameter of hole drilled ranging from 10 to 44 inches.

Y_{MC} (given ϕ = 10 in.)	Y_{MC} (given ϕ = 11 in.)	Y_{MC} (given ϕ = 12 in.)	Y_{MC} (given ϕ = 13 in.)	Y_{MC} (given ϕ = 14 in.)	Y_{MC} (given ϕ = 15 in.)
2194.57	2249.01	2303.46	2357.90	2412.34	2466.79
4389.13	4498.03	4606.91	4715.80	4824.68	4933.57
6583.71	6747.03	6910.37	7073.70	7237.02	7400.36
10128.38	10448.31	10768.25	11088.17	11408.11	11728.03
13056.72	13456.64	13856.55	14256.46	14656.38	15056.29
16181.52	16661.41	17141.32	17621.21	18101.11	18581.00
19502.79	20062.66	20622.53	21182.42	21742.29	22302.18
23020.50	23660.36	24300.22	24940.08	25579.94	26219.80
26734.67	27454.52	28174.36	28894.20	29614.05	30333.89
30645.30	31445.13	32244.96	33044.79	33844.61	34644.44

Y_{MC} (given ϕ = 16 in.)	Y_{MC} (given ϕ = 17 in.)	Y_{MC} (given ϕ = 18 in.)	Y_{MC} (given ϕ = 19 in.)	Y_{MC} (given ϕ = 20 in.)	Y_{MC} (given ϕ = 21 in.)
2521.22	2575.68	2630.11	2684.56	2739.00	2793.44
5042.46	5151.34	5260.23	5369.11	5478.01	5586.38
7563.68	8150.29	9316.09	9556.03	9795.97	10035.93
12047.97	12367.90	12687.82	13007.77	13327.69	13647.61
15456.21	15856.11	16256.03	16655.94	17055.87	17455.77
19060.91	19540.79	20020.69	20500.59	20980.49	21460.36
22862.06	23421.93	23981.81	24541.70	25101.56	25661.45
26859.68	27499.52	28139.39	28779.26	29419.11	30058.97
31053.75	31773.57	32493.42	33213.28	33933.12	34652.96
35444.27	36244.09	37043.91	37843.76	38643.58	39443.40

Continued

Y_{MC} (given ϕ = 22 in.)	Y_{MC} (given ϕ = 23 in.)	Y_{MC} (given ϕ = 24 in.)	Y_{MC} (given ϕ = 25 in.)	Y_{MC} (given ϕ = 26 in.)	Y_{MC} (given ϕ = 27 in.)
2847.89	2902.33	2956.77	3011.22	3065.66	3120.10
5695.78	5804.66	5913.54	6790.40	7420.52	7580.49
10275.88	10515.82	10755.78	10995.72	11235.66	11475.62
13967.56	14287.48	14607.41	14927.34	15247.28	15567.21
17855.69	18255.60	18655.51	19055.42	19455.34	19855.26
21940.28	22420.17	22900.07	23379.96	23859.87	24339.75
26221.33	26781.20	27341.09	27900.96	28460.84	29020.73
30698.84	31338.70	31978.55	32618.41	33258.29	33898.15
35372.81	36092.63	36812.50	37532.34	38252.18	38972.03
40243.24	41043.04	41842.89	42642.70	43442.52	44242.38

Y_{MC} (given ϕ = 28 in.)	Y_{MC} (given ϕ = 29 in.)	Y_{MC} (given ϕ = 30 in.)	Y_{MC} (given ϕ = 31 in.)	Y_{MC} (given ϕ = 32 in.)	Y_{MC} (given ϕ = 33 in.)
3174.54	3228.99	3283.43	3337.88	3392.32	4292.23
7740.45	7900.42	8060.38	8220.35	8380.31	8540.28
11715.57	11955.51	12195.46	12435.41	12675.36	12915.31
15887.13	16207.07	16527.00	16846.92	17166.87	17486.79
20255.15	20655.09	21054.99	21454.91	21854.82	22254.73
24819.66	25299.55	25779.46	26259.33	26739.24	27219.14
29580.59	30140.49	30700.36	31260.23	31820.11	32380.02
34537.99	35177.89	35817.72	36457.59	37097.45	37737.32
39691.85	40411.73	41131.55	41851.41	42571.21	43291.10
45042.17	45842.08	46641.80	47441.70	48241.50	49041.30

Y_{MC} (given ϕ = 34 in.)	Y_{MC} (given ϕ = 35 in.)	Y_{MC} (given ϕ = 36 in.)	Y_{MC} (given ϕ = 37 in.)	Y_{MC} (given ϕ = 38 in.)	Y_{MC} (given ϕ = 39 in.)
4441.70	4521.67	4601.66	4681.64	4761.62	4841.61
8700.24	8860.21	9020.18	9180.13	9340.11	9500.07
13155.24	13395.21	13635.15	13875.09	14115.05	14354.99
17806.72	18126.65	18446.58	18766.52	19086.44	19406.37
22654.64	23054.57	23454.48	23854.37	24254.31	24654.20
27699.02	28178.94	28658.82	29138.71	29618.63	30098.52
32939.87	33499.76	34059.64	34619.50	35179.40	35739.27
38377.17	39017.03	39656.88	40296.80	40936.59	41576.50
44011.00	44730.80	45450.59	46170.41	46890.30	47610.20
49841.11	50641.00	51440.80	52240.59	53040.50	53840.30

Y_{MC} (given ϕ = 40 in.)	Y_{MC} (given ϕ = 41 in.)	Y_{MC} (given ϕ = 42 in.)	Y_{MC} (given ϕ = 43 in.)	Y_{MC} (given ϕ = 44 in.)
4921.59	5001.57	5081.56	5161.53	5241.52
9660.04	9820.00	9979.97	10139.93	10299.89
14594.95	14834.89	15074.83	15314.79	15554.74
19726.31	20046.23	20366.17	20686.09	21006.03
25054.14	25454.05	25853.94	26253.87	26653.80
30578.41	31058.30	31538.21	32018.09	32497.98
36299.11	36859.09	37418.91	37978.70	38538.70
42216.30	42856.20	43496.11	44135.89	44775.80
48330.00	49049.89	49769.61	50489.59	51209.30
53108.61	48645.89	49190.41	49734.91	50279.30

Table 35

MARGINAL DRILLING COSTS FOR
UNCASED WELLS IN SOFT ROCK
AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$$Y_{MUC} = Y_{TU}(\phi+1) - Y_{TU}(\phi)$$

Where:

Y_{MUC} = Marginal drilling cost;

$Y_{TU}(\phi+1)$ = Total drilling cost for uncased wells in soft rock at a diameter $\phi+1$;

$Y_{TU}(\phi)$ = Total drilling costs for uncased wells in soft rock at a diameter ϕ;

ϕ = Diameter of the hole drilled ranging from 10 to 44 inches.

Y_{MUC} (given ϕ = 10 in.)	Y_{MUC} (given ϕ = 11 in.)	Y_{MUC} (given ϕ = 12 in.)	Y_{MUC} (given ϕ = 13 in.)	Y_{MUC} (given ϕ = 14 in.)	Y_{MUC} (given ϕ = 15 in.)
385.32	407.23	429.15	451.06	472.98	494.90
770.64	814.47	858.29	902.13	945.96	989.78
1155.95	1221.70	1287.44	1353.19	1418.94	1484.68
2163.50	2276.69	2389.90	2503.10	2616.30	2729.49
2732.26	2873.75	3015.26	3156.76	3298.26	3439.76
3350.13	3519.93	3689.74	3859.53	4029.34	4199.13
4017.13	4215.22	4413.32	4611.43	4809.52	5007.62
4733.22	4959.63	5186.03	5412.43	5638.83	5865.23
5498.44	5753.15	6007.85	6262.54	6517.25	6771.95
6312.78	6595.78	6878.78	7161.78	7444.78	7727.79

Y_{MUC} (given ϕ = 16 in.)	Y_{MUC} (given ϕ = 17 in.)	Y_{MUC} (given ϕ = 18 in.)	Y_{MUC} (given ϕ = 19 in.)	Y_{MUC} (given ϕ = 20 in.)	Y_{MUC} (given ϕ = 21 in.)
516.80	538.73	560.64	582.55	604.47	626.39
1033.62	1077.45	1121.28	1165.10	1208.94	1252.77
1550.42	1809.60	2323.05	2407.95	2492.85	2577.76
2842.70	2955.90	3069.10	3182.30	3295.50	3408.70
3581.26	3722.76	3864.26	4005.76	4147.26	4288.76
4368.94	4538.73	4708.54	4878.34	5048.13	5217.94
5205.73	5403.83	5601.92	5800.03	5998.13	6196.23
6091.63	6318.03	6544.43	6770.83	6997.24	7223.63
7026.65	7281.35	7536.05	7790.76	8045.45	8300.15
8010.78	8293.78	8576.79	8859.79	9142.78	9425.79

Continued

Y_{MUC} (given ϕ = 22 in.)	Y_{MUC} (given ϕ = 23 in.)	Y_{MUC} (given ϕ = 24 in.)	Y_{MUC} (given ϕ = 25 in.)	Y_{MUC} (given ϕ = 26 in.)	Y_{MUC} (given ϕ = 27 in.)
648.30	670.21	692.13	714.05	735.96	757.87
1296.60	1340.43	1384.26	1795.28	2078.93	2135.52
2662.65	2747.55	2832.46	2917.35	3002.26	3087.15
3521.90	3635.10	3748.30	3861.50	3974.70	4087.91
4430.26	4571.77	4713.26	4854.76	4996.26	5137.77
5387.74	5557.54	5727.34	5897.13	6066.94	6236.74
6394.32	6592.43	6790.53	6988.63	7186.73	7384.84
7450.03	7676.44	7902.84	8129.23	8355.64	8582.03
8554.86	8809.55	9064.26	9318.95	9573.66	9828.35
9708.79	9991.79	10274.79	10557.79	10840.79	11123.79

Y_{MUC} (given ϕ = 28 in.)	Y_{MUC} (given ϕ = 29 in.)	Y_{MUC} (given ϕ = 30 in.)	Y_{MUC} (given ϕ = 31 in.)	Y_{MUC} (given ϕ = 32 in.)	Y_{MUC} (given ϕ = 33 in.)
779.79	801.71	823.62	845.54	867.45	1363.53
2192.12	2248.72	2305.32	2361.93	2418.52	2475.12
3172.05	3256.96	3341.86	3426.75	3511.65	3596.56
4201.10	4314.30	4427.50	4540.71	4653.90	4767.10
5279.26	5420.77	5562.26	5703.77	5845.26	5986.77
6406.54	6576.35	6746.14	6915.94	7085.74	7255.55
7582.93	7781.03	7979.13	8177.24	8375.33	8573.43
8808.44	9034.84	9261.24	9487.64	9714.04	9940.44
10083.06	10337.76	10592.46	10847.16	11101.86	11356.56
11406.79	11689.80	11972.79	12255.80	12538.79	12821.80

Y_{MUC} (given ϕ = 34 in.)	Y_{MUC} (given ϕ = 35 in.)	Y_{MUC} (given ϕ = 36 in.)	Y_{MUC} (given ϕ = 37 in.)	Y_{MUC} (given ϕ = 38 in.)	Y_{MUC} (given ϕ = 39 in.)
1431.11	1459.40	1487.71	1516.00	1544.31	1572.60
2531.72	2588.33	2644.92	2701.52	2758.13	2814.72
3681.46	3766.35	3851.26	3936.16	4021.05	4105.96
4880.31	4993.50	5106.71	5219.90	5333.10	5446.31
6128.26	6269.77	6411.27	6552.76	6694.27	6835.77
7425.34	7595.14	7764.95	7934.74	8104.54	8274.35
8771.54	8969.64	9167.73	9365.83	9563.94	9762.04
10166.84	10393.24	10619.64	10846.04	11072.45	11298.84
11611.26	11865.97	12120.66	12375.36	12630.06	12884.77
13104.79	13387.80	13670.81	13953.78	14236.82	14519.79

Y_{MUC} (given ϕ = 40 in.)	Y_{MUC} (given ϕ = 41 in.)	Y_{MUC} (given ϕ = 42 in.)	Y_{MUC} (given ϕ = 43 in.)	Y_{MUC} (given ϕ = 44 in.)
1600.91	1629.20	1657.50	1685.81	1714.10
2871.32	2927.93	2984.52	3041.13	3097.72
4190.86	4275.76	4360.65	4445.56	4530.46
5559.51	5672.70	5785.91	5899.10	6012.31
6977.27	7118.77	7260.27	7401.77	7543.27
8444.15	8613.94	8783.75	8953.55	9123.34
9960.14	10158.24	10356.34	10554.44	10752.53
11525.24	11751.65	11978.04	12204.45	12430.35
13139.47	13394.16	13648.87	13903.57	14158.26
14354.21	13102.62	13321.75	13540.92	13760.06

Table 36

MARGINAL DRILLING COSTS FOR
UNCASED WELLS IN MEDIUM SOFT ROCK
AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$Y_{MUC} = Y_{TU}(\phi+1) - Y_{TU}(\phi)$

Where:

Y_{MUC} = Marginal drilling cost;

$Y_{TU}(\phi+1)$ = Total drilling cost for uncased wells in medium soft rock at a diameter $\phi+1$;

$Y_{TU}(\phi)$ = Total drilling costs for uncased wells in medium soft rock at a diameter ϕ;

ϕ = Diameter of the hole drilled ranging from 10 to 44 inches.

Y_{MUC} (given ϕ = 10 in.)	Y_{MUC} (given ϕ = 11 in.)	Y_{MUC} (given ϕ = 12 in.)	Y_{MUC} (given ϕ = 13 in.)	Y_{MUC} (given ϕ = 14 in.)	Y_{MUC} (given ϕ = 15 in.)
457.38	482.09	506.79	531.51	556.22	580.93
914.75	964.18	1013.59	1063.01	1112.44	1161.86
1372.13	1446.26	1520.39	1594.53	1668.65	1742.78
2532.61	2665.50	2798.39	2931.29	3064.18	3197.08
3234.57	3400.69	3566.81	3732.93	3899.04	4065.17
4002.03	4201.36	4400.71	4600.05	4799.40	4998.73
4834.96	5067.53	5300.10	5532.66	5765.23	5997.79
5733.39	5999.18	6264.97	6530.75	6796.55	7062.33
6697.30	6996.31	7295.33	7594.34	7893.35	8192.36
7726.70	8058.93	8391.17	8723.41	9055.64	9387.88

Y_{MUC} (given ϕ = 16 in.)	Y_{MUC} (given ϕ = 17 in.)	Y_{MUC} (given ϕ = 18 in.)	Y_{MUC} (given ϕ = 19 in.)	Y_{MUC} (given ϕ = 20 in.)	Y_{MUC} (given ϕ = 21 in.)
605.64	630.35	655.06	679.77	704.48	729.19
1211.27	1260.70	1310.12	1359.54	1408.96	1458.38
1816.92	2110.01	2693.49	2793.16	2892.84	2992.50
3329.98	3462.86	3595.77	3728.65	3861.55	3994.45
4231.28	4397.40	4563.52	4729.63	4895.76	5061.87
5198.08	5397.41	5596.76	5796.10	5995.45	6194.78
6230.36	6462.92	6695.48	6928.06	7160.62	7393.18
7328.13	7593.91	7859.70	8125.49	8391.28	8657.07
8491.38	8790.39	9089.40	9388.42	9687.43	9986.44
9720.12	10052.35	10384.59	10716.82	11049.07	11381.29

Continued

Y_{MUC} (given ϕ = 22 in.)	Y_{MUC} (given ϕ = 23 in.)	Y_{MUC} (given ϕ = 24 in.)	Y_{MUC} (given ϕ = 25 in.)	Y_{MUC} (given ϕ = 26 in.)	Y_{MUC} (given ϕ = 27 in.)
753.90	778.61	803.32	828.03	852.75	877.45
1507.81	1557.22	1606.64	2067.79	2388.29	2454.73
3092.18	3191.84	3291.52	3391.19	3490.86	3590.53
4127.34	4260.23	4393.13	4526.03	4658.91	4791.82
5227.99	5394.11	5560.22	5726.35	5892.46	6058.58
6394.13	6593.47	6792.81	6992.15	7191.49	7390.84
7625.75	7858.31	8090.88	8323.45	8556.01	8788.57
8922.86	9188.65	9454.43	9720.22	9986.02	10251.80
0285.45	10584.46	10883.48	11182.49	11481.51	11780.51
713.5[illegible]	12045.77	12378.00	12710.24	13042.48	13374.72

Y_{MUC} (given ϕ = 28 in.)	Y_{MUC} (given ϕ = 29 in.)	Y_{MUC} (given ϕ = 30 in.)	Y_{MUC} (given ϕ = 31 in.)	Y_{MUC} (given ϕ = 32 in.)	Y_{MUC} (given ϕ = 33 in.)
902.17	926.87	951.58	976.30	1541.14	1001.01
2521.18	2587.63	2654.08	2720.52	2853.42	2786.97
3690.20	3789.87	3889.55	3989.21	4188.56	4088.88
4924.70	5057.60	5190.50	5323.39	5589.17	5456.29
6224.70	6390.82	6556.93	6723.06	7055.29	6889.17
7590.17	7789.52	7988.87	8188.20	8586.89	8387.54
9021.15	9253.70	9486.28	9718.83	10183.97	9951.40
10517.59	10783.38	11049.18	11314.95	11846.54	11580.75
12079.53	12378.54	12677.55	12976.57	13574.59	13275.57
13706.94	14039.19	14371.42	14703.66	15368.13	15035.90

Y_{MUC} (given ϕ = 34 in.)	Y_{MUC} (given ϕ = 35 in.)	Y_{MUC} (given ϕ = 36 in.)	Y_{MUC} (given ϕ = 37 in.)	Y_{MUC} (given ϕ = 38 in.)	Y_{MUC} (given ϕ = 39 in.)
1616.99	1650.21	1683.44	1716.65	1749.89	1783.11
2919.86	2986.32	3052.76	3119.20	3185.65	3252.11
4288.22	4387.90	4487.57	4587.24	4686.91	4786.58
5722.08	5854.97	5987.86	6120.76	6253.65	6386.54
7221.40	7387.53	7553.65	7719.76	7885.88	8052.00
8786.22	8985.58	9184.91	9384.25	9583.59	9782.94
10416.53	10649.11	10881.66	11114.23	11346.80	11579.36
12112.32	12378.11	12643.91	12909.69	13175.48	13441.28
13873.61	14172.62	14471.63	14770.64	15069.65	15368.67
15700.37	16032.60	16364.85	16697.06	17029.32	17361.55

Y_{MUC} (given ϕ = 40 in.)	Y_{MUC} (given ϕ = 41 in.)	Y_{MUC} (given ϕ = 42 in.)	Y_{MUC} (given ϕ = 43 in.)	Y_{MUC} (given ϕ = 44 in.)
1816.33	1849.55	1882.78	1916.00	1949.23
3318.54	3385.00	3451.44	3517.89	3584.34
4886.25	4985.92	5085.60	5185.26	5284.94
6519.45	6652.33	6785.23	6918.12	7051.02
8218.11	8384.24	8550.35	8716.47	8882.59
9982.28	10181.62	10380.96	10580.30	10779.65
11811.92	12044.49	12277.06	12509.62	12742.18
13707.05	13972.85	14238.64	14504.43	14770.21
15667.67	15966.70	16265.70	16564.72	16863.73
17124.86	15508.31	15755.40	16002.50	16249.63

Table 37

MARGINAL DRILLING COSTS FOR
UNCASED WELLS IN MEDIUM HARD ROCK
AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$Y_{MUC} = Y_{TU}(\phi+1) - Y_{TU}(\phi)$

Where:

Y_{MUC} = Marginal drilling cost;

$Y_{TU}(\phi+1)$ = Total drilling cost for uncased wells in medium hard rock at a diameter $\phi+1$;

$Y_{TU}(\phi)$ = Total drilling costs for uncased wells in medium hard rock at a diameter ϕ;

ϕ = Diameter of the hole drilled ranging from 10 to 44 inches.

Y_{MUC} (given ϕ = 10 in.)	Y_{MUC} (given ϕ = 11 in.)	Y_{MUC} (given ϕ = 12 in.)	Y_{MUC} (given ϕ = 13 in.)	Y_{MUC} (given ϕ = 14 in.)	Y_{MUC} (given ϕ = 15 in.)
538.72	566.22	593.73	621.24	648.74	676.25
1077.44	1132.45	1187.46	1242.47	1297.49	1352.49
1616.16	1698.67	1781.19	1863.71	1946.23	2028.74
2956.43	3110.88	3265.31	3419.75	3574.19	3728.64
3814.19	4007.23	4200.29	4393.33	4586.38	4779.43
4757.35	4989.01	5220.68	5452.32	5683.99	5915.65
5785.94	6056.20	6326.47	6596.74	6867.01	7137.28
6899.94	7208.82	7517.69	7826.57	8135.45	8444.33
8099.35	8446.85	8794.33	9141.81	9489.31	9836.80
9384.19	9770.28	10156.38	10542.49	10928.57	11314.68

Y_{MUC} (given ϕ = 16 in.)	Y_{MUC} (given ϕ = 17 in.)	Y_{MUC} (given ϕ = 18 in.)	Y_{MUC} (given ϕ = 19 in.)	Y_{MUC} (given ϕ = 20 in.)	Y_{MUC} (given ϕ = 21 in.)
703.75	731.26	758.76	786.27	813.78	841.28
1407.51	1462.52	1517.53	1572.54	1627.55	1682.56
2111.26	2443.83	3110.73	3226.57	3342.40	3458.22
3883.07	4037.51	4191.95	4346.39	4500.83	4655.26
4972.48	5165.53	5358.58	5551.63	5744.68	5937.72
6147.31	6378.96	6610.62	6842.29	7073.94	7305.60
7407.56	7677.81	7948.09	8218.36	8488.62	8758.90
8753.21	9062.09	9370.96	9679.85	9988.72	10297.60
10184.29	10531.77	10879.25	11226.76	11574.24	11921.73
11700.78	12086.88	12472.97	12859.07	13245.18	13631.27

Continued

Y_{MUC} (given ϕ = 22 in.)	Y_{MUC} (given ϕ = 23 in.)	Y_{MUC} (given ϕ = 24 in.)	Y_{MUC} (given ϕ = 25 in.)	Y_{MUC} (given ϕ = 26 in.)	Y_{MUC} (given ϕ = 27 in.)
868.79	896.29	923.80	951.30	978.81	1006.32
1737.58	1792.58	1847.60	2368.54	2732.70	2809.92
3574.06	3689.88	3805.72	3921.54	4037.37	4153.21
4809.71	4964.15	5118.58	5273.03	5427.46	5581.91
6130.78	6323.82	6516.88	6709.92	6902.97	7096.03
7537.26	7768.92	8000.58	8232.24	8463.90	8695.55
9029.15	9299.44	9569.70	9839.97	10110.24	10380.51
10606.49	10915.35	11224.25	11533.11	11842.00	12150.87
12269.21	12616.71	12964.19	13311.68	13659.18	14006.66
14017.37	14403.46	14789.56	15175.67	15561.76	15947.86

Y_{MUC} (given ϕ = 28 in.)	Y_{MUC} (given ϕ = 29 in.)	Y_{MUC} (given ϕ = 30 in.)	Y_{MUC} (given ϕ = 31 in.)	Y_{MUC} (given ϕ = 32 in.)	Y_{MUC} (given ϕ = 33 in.)
1033.82	1061.33	1088.83	1116.34	1143.84	1737.00
2887.14	2964.35	3041.58	3118.80	3196.02	3273.23
4269.03	4384.86	4500.69	4616.52	4732.36	4848.18
5736.34	5890.78	6045.22	6199.67	6354.10	6508.54
7289.06	7482.13	7675.17	7868.22	8061.26	8254.32
8927.22	9158.87	9390.54	9622.19	9853.85	10085.51
10650.77	10921.04	11191.32	11461.58	11731.86	12002.12
12459.76	12768.63	13077.51	13386.39	13695.27	14004.15
14354.14	14701.64	15049.13	15396.60	15744.11	16091.59
16333.95	16720.07	17106.15	17492.26	17878.36	18264.44

Y_{MUC} (given ϕ = 34 in.)	Y_{MUC} (given ϕ = 35 in.)	Y_{MUC} (given ϕ = 36 in.)	Y_{MUC} (given ϕ = 37 in.)	Y_{MUC} (given ϕ = 38 in.)	Y_{MUC} (given ϕ = 39 in.)
1822.32	1860.93	1899.54	1938.15	1976.76	2015.37
3350.46	3427.68	3504.89	3582.12	3659.33	3736.56
4964.01	5079.84	5195.67	5311.49	5427.33	5543.16
6662.98	6817.42	6971.86	7126.29	7280.74	7435.18
8447.37	8640.41	8833.47	9026.51	9219.57	9412.61
10317.17	10548.83	10780.49	11012.14	11243.81	11475.47
12272.38	12542.66	12812.94	13083.19	13353.47	13623.73
14313.03	14621.90	14930.79	15239.66	15548.54	15857.42
16439.08	16786.57	17134.06	17481.53	17829.04	18176.53
18650.55	19036.65	19422.75	19808.84	20194.94	20581.04

Y_{MUC} (given ϕ = 40 in.)	Y_{MUC} (given ϕ = 41 in.)	Y_{MUC} (given ϕ = 42 in.)	Y_{MUC} (given ϕ = 43 in.)	Y_{MUC} (given ϕ = 44 in.)
2053.98	2092.59	2131.20	2169.80	2208.42
3813.77	3891.00	3968.21	4045.44	4122.65
5658.99	5774.81	5890.65	6006.47	6122.31
7589.61	7744.06	7898.49	8052.94	8207.37
9605.66	9798.71	9991.76	10184.81	10377.86
11707.13	11938.78	12170.44	12402.10	12633.76
13894.00	14164.28	14434.54	14704.81	14975.07
16166.30	16475.18	16784.05	17092.93	17401.82
18524.01	18871.50	19218.99	19566.47	19913.96
20251.73	18184.79	18459.84	18734.90	19009.95

Table 38

MARGINAL DRILLING COSTS FOR
UNCASED WELLS IN HARD ROCK
AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$Y_{MUC} = Y_{TU}(\phi+1) - Y_{TU}(\phi)$

Where:

Y_{MUC} = Marginal drilling cost;

$Y_{TU}(\phi+1)$ = Total drilling cost for uncased wells in hard rock at a diameter $\phi+1$;

$Y_{TU}(\phi)$ = Total drilling costs for uncased wells in hard rock at a diameter ϕ;

ϕ = Diameter of the hole drilled ranging from 10 to 44 inches.

Y_{MUC} (given ϕ = 10 in.)	Y_{MUC} (given ϕ = 11 in.)	Y_{MUC} (given ϕ = 12 in.)	Y_{MUC} (given ϕ = 13 in.)	Y_{MUC} (given ϕ = 14 in.)	Y_{MUC} (given ϕ = 15 in.)
768.82	801.92	835.02	868.11	901.21	934.30
1537.65	1603.84	1670.03	1736.23	1802.42	1868.61
2306.47	2405.76	2505.05	2604.34	2703.63	2802.91
4201.43	4412.41	4623.37	4834.35	5045.31	5256.27
5534.71	5798.41	6062.12	6325.83	6589.54	6853.25
7019.09	7335.54	7651.99	7968.44	8284.90	8601.35
8654.60	9023.79	9392.98	9762.18	10131.37	10500.56
10441.22	10863.16	11285.10	11707.03	12128.97	12550.91
12378.98	12853.65	13328.34	13803.01	14277.69	14752.36
14467.85	14995.27	15522.69	16050.11	16577.53	17104.94

Y_{MUC} (given ϕ = 16 in.)	Y_{MUC} (given ϕ = 17 in.)	Y_{MUC} (given ϕ = 18 in.)	Y_{MUC} (given ϕ = 19 in.)	Y_{MUC} (given ϕ = 20 in.)	Y_{MUC} (given ϕ = 21 in.)
967.40	1000.50	1033.60	1066.68	1099.79	1132.88
1934.80	2000.99	2067.19	2133.38	2199.57	2265.77
2902.20	3354.05	4285.10	4443.33	4601.56	4759.78
5467.25	5678.21	5889.19	6100.15	6311.12	6522.08
7116.97	7380.67	7644.38	7908.09	8171.81	8435.51
8917.80	9234.25	9550.71	9867.15	10183.61	10500.06
10869.77	11238.95	11608.15	11977.34	12346.54	12715.73
12972.84	13394.77	13816.72	14238.65	14660.59	15082.51
15227.05	15701.71	16176.40	16651.09	17125.76	17600.43
17632.38	18159.78	18687.21	19214.63	19742.05	20269.47

Continued

Y_{MUC} (given ϕ = 22 in.)	Y_{MUC} (given ϕ = 23 in.)	Y_{MUC} (given ϕ = 24 in.)	Y_{MUC} (given ϕ = 25 in.)	Y_{MUC} (given ϕ = 26 in.)	Y_{MUC} (given ϕ = 27 in.)
1165.98	1199.08	1232.17	1265.26	1298.37	1331.46
2331.95	2398.15	2464.34	3175.19	3676.02	3781.50
4918.01	5076.23	5234.46	5392.69	5550.91	5709.14
6733.06	6944.02	7154.99	7365.96	7576.93	7787.89
8699.22	8962.94	9226.64	9490.35	9754.06	10017.78
10816.51	11132.97	11449.42	11765.86	12082.33	12398.77
13084.92	13454.12	13823.31	14192.51	14561.70	14930.89
15504.47	15926.38	16348.34	16770.26	17192.21	17614.13
18075.11	18549.79	19024.48	19499.14	19973.83	20448.50
20796.90	21324.31	21851.73	22379.15	22906.57	23433.99

Y_{MUC} (given ϕ = 28 in.)	Y_{MUC} (given ϕ = 29 in.)	Y_{MUC} (given ϕ = 30 in.)	Y_{MUC} (given ϕ = 31 in.)	Y_{MUC} (given ϕ = 32 in.)	Y_{MUC} (given ϕ = 33 in.)
1364.55	1397.65	1430.75	1463.84	1496.94	2261.27
3886.99	3992.47	4097.96	4203.44	4308.92	4414.41
5867.36	6025.59	6183.82	6342.04	6500.27	6658.50
7998.86	8209.83	8420.80	8631.77	8842.74	9053.70
10281.48	10545.19	10808.91	11072.61	11336.32	11600.04
12715.22	13031.68	13348.14	13664.57	13981.04	14297.48
15300.09	15669.29	16038.48	16407.67	16776.86	17146.05
18036.08	18458.02	18879.94	19301.88	19723.82	20145.76
20923.18	21397.87	21872.54	22347.20	22821.90	23296.58
23961.41	24488.84	25016.24	25543.67	26071.09	26598.50

Y_{MUC} (given ϕ = 34 in.)	Y_{MUC} (given ϕ = 35 in.)	Y_{MUC} (given ϕ = 36 in.)	Y_{MUC} (given ϕ = 37 in.)	Y_{MUC} (given ϕ = 38 in.)	Y_{MUC} (given ϕ = 39 in.)
2374.18	2426.93	2479.67	2532.41	2585.15	2637.90
4519.89	4625.38	4730.86	4836.34	4941.83	5047.31
6816.72	6974.94	7133.18	7291.40	7449.62	7607.85
9264.67	9475.64	9686.61	9897.57	10108.54	10319.51
11863.74	12127.45	12391.17	12654.87	12918.58	13182.30
14613.94	14930.39	15246.84	15563.30	15879.74	16196.20
17515.26	17884.45	18253.65	18622.82	18992.04	19361.22
20567.69	20989.62	21411.57	21833.50	22255.43	22677.37
23771.25	24245.93	24720.61	25195.27	25669.97	26144.64
27125.94	27653.37	28180.77	28708.18	29235.62	29763.02

Y_{MUC} (given ϕ = 40 in.)	Y_{MUC} (given ϕ = 41 in.)	Y_{MUC} (given ϕ = 42 in.)	Y_{MUC} (given ϕ = 43 in.)	Y_{MUC} (given ϕ = 44 in.)
2690.64	2743.37	2796.13	2848.86	2901.60
5152.80	5258.28	5363.76	5469.25	5574.73
7766.08	7924.30	8082.53	8240.76	8398.98
10530.49	10741.45	10952.41	11163.38	11374.36
13446.00	13709.73	13973.41	14237.13	14500.85
16512.65	16829.10	17145.56	17462.00	17778.47
19730.41	20099.62	20468.82	20837.98	21207.20
23099.31	23521.24	23943.18	24365.12	24787.05
26619.32	27094.01	27568.67	28043.36	28518.02
29092.12	25504.16	25835.11	26166.06	26497.04

Table 39

MARGINAL DRILLING COSTS FOR
UNCASED WELLS IN VERY HARD ROCK
AS A FUNCTION OF DIAMETER AT A GIVEN DEPTH
(in dollars)

$Y_{MUC} = Y_{TU}(\phi+1) - Y_{TU}(\phi)$

Where:

Y_{MUC} = Marginal drilling cost;

$Y_{TU}(\phi+1)$ = Total drilling cost for uncased wells in very hard rock at a diameter $\phi+1$;

$Y_{TU}(\phi)$ = Total drilling costs for uncased wells in very hard rock at a diameter ϕ;

ϕ = Diameter of the hole drilled ranging from 10 to 44 inches.

Y_{MUC} (given ϕ = 10 in.)	Y_{MUC} (given ϕ = 11 in.)	Y_{MUC} (given ϕ = 12 in.)	Y_{MUC} (given ϕ = 13 in.)	Y_{MUC} (given ϕ = 14 in.)	Y_{MUC} (given ϕ = 15 in.)
945.79	984.48	1023.17	1061.85	1100.54	1139.23
1891.58	1968.96	2046.34	2123.70	2201.08	2278.46
2837.38	2953.44	3069.50	3185.57	3301.32	3417.68
5133.28	5390.18	5647.09	5903.99	6160.90	6417.81
6812.85	7133.97	7455.11	7776.24	8097.36	8418.51
8688.86	9074.23	9459.58	9844.94	10230.30	10615.66
10761.35	11210.93	11660.52	12110.10	12559.68	13009.27
13030.29	13544.10	14057.91	14571.72	15085.54	15599.33
15495.68	16073.73	16651.76	17229.80	17807.83	18385.88
18157.54	18799.82	19442.06	20084.34	20726.59	21368.86

Y_{MUC} (given ϕ = 16 in.)	Y_{MUC} (given ϕ = 17 in.)	Y_{MUC} (given ϕ = 18 in.)	Y_{MUC} (given ϕ = 19 in.)	Y_{MUC} (given ϕ = 20 in.)	Y_{MUC} (given ϕ = 21 in.)
1177.91	1216.60	1255.29	1293.97	1332.66	1371.35
2355.83	2433.20	2510.57	2587.95	2665.32	2742.69
3533.74	4073.07	5191.61	5384.28	5576.96	5769.64
6674.71	6931.61	7188.52	7445.42	7702.33	7959.23
8739.63	9060.76	9381.89	9703.03	10024.16	10345.29
11001.01	11386.37	11771.73	12157.08	12542.45	12927.80
13458.86	13908.44	14358.01	14807.61	15257.19	15706.77
16113.16	16626.95	17140.78	17654.58	18168.39	18682.20
18963.90	19541.94	20119.98	20698.03	21276.05	21854.09
22011.12	22653.39	23295.64	23937.91	24580.18	25222.43

Continued

Y_{MUC} (given ϕ = 22 in.)	Y_{MUC} (given ϕ = 23 in.)	Y_{MUC} (given ϕ = 24 in.)	Y_{MUC} (given ϕ = 25 in.)	Y_{MUC} (given ϕ = 26 in.)	Y_{MUC} (given ϕ = 27 in.)
1410.04	1448.72	1487.40	1526.10	1564.78	1603.46
2820.07	2897.44	2974.32	3820.15	4418.76	4547.22
5962.31	6155.00	6347.67	6540.35	6733.04	6925.71
8216.15	8473.04	8729.95	8986.85	9243.76	9500.67
10666.42	10987.55	11308.68	11629.81	11950.95	12272.08
13313.16	13698.51	14083.88	14469.23	14854.59	15239.95
16156.36	16605.94	17055.52	17505.11	17954.69	18404.27
19196.02	19709.82	20223.63	20737.44	21251.25	21765.06
22432.12	23010.16	23588.20	24166.24	24744.28	25322.30
25864.72	26506.96	27149.20	27791.49	28433.75	29076.01

Y_{MUC} (given ϕ = 28 in.)	Y_{MUC} (given ϕ = 29 in.)	Y_{MUC} (given ϕ = 30 in.)	Y_{MUC} (given ϕ = 31 in.)	Y_{MUC} (given ϕ = 32 in.)	Y_{MUC} (given ϕ = 33 in.)
1642.16	1680.84	1719.53	1758.21	1796.90	2681.06
4675.67	4804.12	4932.57	5061.03	5189.48	5317.93
7118.39	7311.07	7503.75	7696.42	7889.11	8081.78
9757.56	10014.48	10271.38	10528.29	10785.19	11042.09
12593.20	12914.35	13235.47	13556.60	13877.73	14198.87
15625.30	16010.66	16396.03	16781.37	17166.74	17552.09
18853.86	19303.45	19753.03	20202.61	20652.19	21101.77
22278.88	22792.69	23306.49	23820.30	24334.12	24847.93
25900.34	26478.39	27056.41	27634.45	28212.48	28790.53
29718.27	30360.55	31002.80	31645.05	32287.34	32929.58

Y_{MUC} (given ϕ = 34 in.)	Y_{MUC} (given ϕ = 35 in.)	Y_{MUC} (given ϕ = 36 in.)	Y_{MUC} (given ϕ = 37 in.)	Y_{MUC} (given ϕ = 38 in.)	Y_{MUC} (given ϕ = 39 in.)
2814.77	2878.98	2943.22	3007.44	3071.67	3135.89
5446.38	5574.83	5703.29	5831.74	5960.20	6088.64
8274.46	8467.14	8659.83	8852.49	9045.18	9237.86
11299.00	11555.91	11812.81	12069.72	12326.61	12583.53
14519.99	14841.13	15162.26	15483.39	15804.52	16125.65
17937.45	18322.81	18708.17	19093.51	19478.89	19864.23
21551.37	22000.96	22450.52	22900.11	23349.70	23799.28
25361.73	25875.54	26389.36	26903.17	27416.96	27930.79
29368.57	29946.61	30524.63	31102.66	31680.71	32258.75
33571.85	34214.12	34856.37	35498.63	36140.95	36783.09

Y_{MUC} (given ϕ = 40 in.)	Y_{MUC} (given ϕ = 41 in.)	Y_{MUC} (given ϕ = 42 in.)	Y_{MUC} (given ϕ = 43 in.)	Y_{MUC} (given ϕ = 44 in.)
3200.12	3264.35	3328.57	3392.80	3457.03
6217.10	6345.56	6474.00	6602.45	6730.91
9430.53	9623.22	9815.89	10008.57	10201.26
12840.43	13097.34	13354.24	13611.14	13868.06
16446.79	16767.92	17089.04	17410.18	17731.31
20249.59	20634.96	21020.31	21405.66	21791.05
24248.87	24698.45	25148.02	25597.63	26047.20
28444.60	28958.40	29472.22	29986.01	30499.85
32836.78	33414.82	33992.90	34570.80	35149.00
35893.91	31273.70	31660.59	32047.50	32434.30

Table 40

ESTIMATED DRILLING TIME FUNCTION FOR GOMEZ FIELD (TEXAS)

FOR 12-1/4-INCH DIAMETER WELLS

$$Y_{DT} = 0.126(10^{-5})X^2 + 0.06X - 31$$

where: Y_{DT} = Drilling time in hours

X = Depth in feet

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
-0.31091213E-01	0.20843568E-01	-0.14916454E 01	0.09999999E 01	0.
0.59937941E-04	0.78546197E-05	0.76309157E 01	0.60667446E 04	0.95545216E 00
0.12643326E-08	0.65738512E-09	0.19232754E 01	0.43287724E 08	0.94466193E 00

```
       RSQ =      0.9143
         R =      0.9562
F( 2,228)=  1215.8740
    SUMUSQ =      0.7859
DURBIN-W.=      0.1169
```

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
1	821.00	0.0182	0.0190	-0.0007
2	1107.00	0.0462	0.0368	0.0094
3	1579.00	0.0657	0.0667	-0.0010
4	1960.00	0.0927	0.0912	0.0015
5	2340.00	0.1147	0.1161	-0.0013
6	2690.00	0.1360	0.1393	-0.0033

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
7	3068.00	0.1582	0.1647	-0.0064
8	3437.00	0.1787	0.1899	-0.0111
9	3742.00	0.1977	0.2109	-0.0132
10	4234.00	0.2182	0.2454	-0.0271
11	4509.00	0.2327	0.2649	-0.0321
12	4708.00	0.2477	0.2791	-0.0314
13	4912.00	0.2595	0.2938	-0.0343
14	5146.00	0.2745	0.3108	-0.0363
15	5312.00	0.2910	0.3230	-0.0320
16	5507.00	0.3072	0.3373	-0.0301
17	5690.00	0.3202	0.3509	-0.0306
18	5872.00	0.3317	0.3645	-0.0327
19	5953.00	0.3400	0.3705	-0.0305
20	6473.00	0.3772	0.4099	-0.0326
21	6745.00	0.3982	0.4307	-0.0325
22	6950.00	0.4150	0.4465	-0.0315
23	7818.00	0.4792	0.5148	-0.0355
24	7998.00	0.4952	0.5292	-0.0339
25	8182.00	0.5107	0.5440	-0.0332
26	8496.00	0.5422	0.5694	-0.0272
27	8758.00	0.5682	0.5908	-0.0226
28	8934.00	0.5890	0.6053	-0.0163
29	9059.00	0.6002	0.6156	-0.0154
30	9104.00	0.6065	0.6194	-0.0129
31	9214.00	0.6205	0.6285	-0.0080
32	9371.00	0.6452	0.6416	0.0036
33	9511.00	0.6680	0.6533	0.0147
34	9540.00	0.6735	0.6558	0.0177
35	1500.00	0.0673	0.0617	0.0056
36	2500.00	0.1344	0.1267	0.0077

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
37	2967.00	0.1595	0.1579	0.0016
38	3060.00	0.1780	0.1642	0.0138
39	3166.00	0.1935	0.1713	0.0221
40	3386.00	0.2225	0.1864	0.0361
41	3589.00	0.2475	0.2003	0.0472
42	3735.00	0.2597	0.2104	0.0493
43	3943.00	0.2775	0.2249	0.0526
44	4321.00	0.2990	0.2515	0.0475
45	4690.00	0.3165	0.2778	0.0387
46	4948.00	0.3345	0.2964	0.0380
47	5206.00	0.3530	0.3152	0.0378
48	5449.00	0.3785	0.3331	0.0454
49	5612.00	0.3952	0.3451	0.0501
50	5860.00	0.4202	0.3636	0.0567
51	5981.00	0.4290	0.3726	0.0564
52	6933.00	0.5345	0.4452	0.0892
53	7222.00	0.5605	0.4677	0.0928
54	7489.00	0.5822	0.4887	0.0935
55	7756.00	0.6077	0.5098	0.0979
56	8021.00	0.6262	0.5310	0.0952
57	8315.00	0.6455	0.5547	0.0908
58	8651.00	0.6735	0.5821	0.0914
59	8872.00	0.6977	0.6002	0.0975
60	9092.00	0.7182	0.6184	0.0999
61	9295.00	0.7402	0.6353	0.1050
62	9512.00	0.7645	0.6534	0.1110
63	9790.00	0.7912	0.6769	0.1143
64	10010.00	0.8130	0.6956	0.1174
65	10109.00	0.8285	0.7040	0.1245
66	558.00	0.0250	0.0027	0.0223

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
67	1320.00	0.0555	0.0502	0.0053
68	1540.00	0.0645	0.0642	0.0003
69	1761.00	0.0800	0.0784	0.0016
70	2072.00	0.1015	0.0985	0.0030
71	2345.00	0.1205	0.1164	0.0041
72	2546.00	0.1345	0.1297	0.0048
73	2795.00	0.1475	0.1463	0.0012
74	3345.00	0.1613	0.1835	-0.0223
75	3500.00	0.1753	0.1942	-0.0189
76	3707.00	0.1898	0.2085	-0.0187
77	4150.00	0.2048	0.2394	-0.0347
78	4350.00	0.2170	0.2536	-0.0365
79	4471.00	0.2285	0.2622	-0.0336
80	4662.00	0.2448	0.2758	-0.0310
81	4872.00	0.2620	0.2909	-0.0289
82	5030.00	0.2753	0.3024	-0.0271
83	5106.00	0.2825	0.3079	-0.0254
84	5267.00	0.2990	0.3197	-0.0207
85	5390.00	0.3090	0.3287	-0.0197
86	5561.00	0.3255	0.3413	-0.0158
87	6369.00	0.4075	0.4019	0.0056
88	6467.00	0.4243	0.4094	0.0149
89	6469.00	0.4243	0.4096	0.0147
90	6623.00	0.4388	0.4213	0.0174
91	6759.00	0.4568	0.4318	0.0250
92	7555.00	0.5440	0.4939	0.0501
93	7727.00	0.5618	0.5075	0.0542
94	7962.00	0.5763	0.5263	0.0500
95	8175.00	0.5943	0.5434	0.0509
96	8380.00	0.6120	0.5600	0.0521

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
97	8545.00	0.6278	0.5734	0.0544
98	8727.00	0.6415	0.5883	0.0533
99	9018.00	0.6608	0.6123	0.0485
100	9322.00	0.6823	0.6375	0.0448
101	9597.00	0.7060	0.6606	0.0454
102	1500.00	0.0673	0.0617	0.0056
103	2500.00	0.1344	0.1267	0.0077
104	3203.00	0.1722	0.1739	-0.0017
105	3480.00	0.1879	0.1928	-0.0049
106	3808.00	0.2039	0.2155	-0.0116
107	3976.00	0.2129	0.2272	-0.0143
108	4583.00	0.2329	0.2702	-0.0372
109	4856.00	0.2477	0.2898	-0.0421
110	4945.00	0.2534	0.2962	-0.0428
111	5061.00	0.2614	0.3046	-0.0432
112	5190.00	0.2687	0.3140	-0.0454
113	6610.00	0.3822	0.4203	-0.0382
114	7950.00	0.4942	0.5253	-0.0312
115	8098.00	0.5212	0.5372	-0.0160
116	8333.00	0.5422	0.5562	-0.0140
117	8357.00	0.5479	0.5581	-0.0102
118	8575.00	0.5697	0.5758	-0.0062
119	8765.00	0.5867	0.5914	-0.0047
120	8810.00	0.5907	0.5951	-0.0044
121	8995.00	0.6114	0.6103	0.0011
122	9110.00	0.6219	0.6199	0.0020
123	9265.00	0.6432	0.6328	0.0104
124	9376.00	0.6544	0.6420	0.0124
125	9595.00	0.6754	0.6604	0.0150
126	1500.00	0.0673	0.0617	0.0056

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
127	2500.00	0.1344	0.1267	0.0077
128	3225.00	0.1733	0.1754	-0.0021
129	3510.00	0.2083	0.1949	0.0134
130	3890.00	0.2458	0.2212	0.0246
131	3993.00	0.2563	0.2284	0.0279
132	4201.00	0.2688	0.2430	0.0257
133	4747.00	0.2925	0.2819	0.0106
134	4952.00	0.3070	0.2967	0.0103
135	5132.00	0.3235	0.3098	0.0137
136	5407.00	0.3423	0.3300	0.0123
137	5589.00	0.3560	0.3434	0.0126
138	5764.00	0.3708	0.3564	0.0144
139	5926.00	0.3860	0.3685	0.0175
140	6050.00	0.3980	0.3778	0.0202
141	6149.00	0.4108	0.3853	0.0255
142	6286.00	0.4273	0.3956	0.0316
143	6678.00	0.4680	0.4256	0.0425
144	7135.00	0.5198	0.4609	0.0588
145	7251.00	0.5348	0.4700	0.0648
146	7381.00	0.5528	0.4802	0.0726
147	7696.00	0.5935	0.5051	0.0884
148	7878.00	0.6138	0.5196	0.0942
149	8040.00	0.6323	0.5325	0.0997
150	8253.00	0.6540	0.5497	0.1043
151	8345.00	0.6683	0.5571	0.1111
152	8517.00	0.6873	0.5711	0.1162
153	8751.00	0.7120	0.5902	0.1218
154	8988.00	0.7383	0.6098	0.1285
155	9178.00	0.7630	0.6255	0.1375
156	9349.00	0.7880	0.6398	0.1482

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
157	9412.00	0.7945	0.6450	0.1495
158	1500.00	0.0673	0.0617	0.0056
159	2500.00	0.1344	0.1267	0.0077
160	3466.00	0.1863	0.1918	-0.0055
161	3552.00	0.1941	0.1978	-0.0037
162	3807.00	0.2151	0.2154	-0.0004
163	3955.00	0.2286	0.2257	0.0028
164	4201.00	0.2451	0.2430	0.0020
165	4731.00	0.2658	0.2808	-0.0150
166	4902.00	0.2773	0.2931	-0.0158
167	5862.00	0.3458	0.3637	-0.0179
168	6287.00	0.3731	0.3957	-0.0227
169	6585.00	0.3908	0.4184	-0.0276
170	7946.00	0.4621	0.5250	-0.0629
171	9264.00	0.5418	0.6327	-0.0909
172	9481.00	0.5588	0.6508	-0.0920
173	9665.00	0.5733	0.6663	-0.0930
174	1500.00	0.0673	0.0617	0.0056
175	2500.00	0.1344	0.1267	0.0077
176	3223.00	0.1732	0.1752	-0.0020
177	3820.00	0.1955	0.2163	-0.0208
178	4172.00	0.2137	0.2410	-0.0272
179	4674.00	0.2307	0.2767	-0.0459
180	5067.00	0.2515	0.3051	-0.0536
181	5460.00	0.2690	0.3339	-0.0649
182	5735.00	0.2812	0.3542	-0.0730
183	6735.00	0.3265	0.4299	-0.1035
184	7687.00	0.3752	0.5044	-0.1291
185	8405.00	0.4095	0.5620	-0.1525
186	8774.00	0.4322	0.5921	-0.1599

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
187	9047.00	0.4487	0.6147	-0.1659
188	9251.00	0.4622	0.6316	-0.1694
189	9473.00	0.4740	0.6502	-0.1762
190	9709.00	0.4915	0.6700	-0.1785
191	9919.00	0.5060	0.6878	-0.1818
192	10077.00	0.5190	0.7013	-0.1823
193	10098.00	0.5322	0.7031	-0.1708
194	1500.00	0.0673	0.0617	0.0056
195	2500.00	0.1344	0.1267	0.0077
196	3240.00	0.1744	0.1764	-0.0020
197	3557.00	0.1989	0.1981	0.0008
198	3897.00	0.2254	0.2217	0.0037
199	4490.00	0.2531	0.2635	-0.0104
200	4790.00	0.2744	0.2850	-0.0107
201	5048.00	0.2929	0.3037	-0.0108
202	5395.00	0.3159	0.3291	-0.0132
203	6710.00	0.3969	0.4280	-0.0311
204	7814.00	0.4694	0.5145	-0.0451
205	7991.00	0.4859	0.5286	-0.0427
206	8162.00	0.4999	0.5423	-0.0425
207	8392.00	0.5126	0.5609	-0.0483
208	8692.00	0.5394	0.5854	-0.0460
209	8877.00	0.5599	0.6006	-0.0407
210	9028.00	0.5801	0.6131	-0.0330
211	9166.00	0.5944	0.6245	-0.0302
212	9366.00	0.6181	0.6412	-0.0231
213	9491.00	0.6376	0.6517	-0.0140
214	1500.00	0.0673	0.0617	0.0056
215	2500.00	0.1344	0.1267	0.0077
216	3245.00	0.1744	0.1767	-0.0023

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
217	3850.00	0.2217	0.2184	0.0033
218	4068.00	0.2409	0.2337	0.0073
219	4600.00	0.2614	0.2714	-0.0100
220	4916.00	0.2794	0.2941	-0.0147
221	5212.00	0.3024	0.3157	-0.0132
222	5566.00	0.3272	0.3417	-0.0145
223	6264.00	0.3797	0.3940	-0.0143
224	7411.00	0.4477	0.4825	-0.0349
225	7929.00	0.4857	0.5236	-0.0380
226	8484.00	0.5229	0.5684	-0.0455
227	8766.00	0.5377	0.5915	-0.0538
228	9040.00	0.5729	0.6141	-0.0412
229	9312.00	0.6094	0.6367	-0.0273
230	9550.00	0.6439	0.6566	-0.0127
231	9692.00	0.6619	0.6686	-0.0067

Table 41

ESTIMATED DRILLING TIME FUNCTION FOR GOMEZ FIELD (TEXAS)

FOR 13-3/4-INCH DIAMETER WELLS

$$Y_{DT} = 10.45 + 0.88(10^{-2})X + 0.60(10^{-5})X^2$$

where: Y_{DT} = Drilling time in hours

X = Depth in feet

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.10457873E-01	0.17136010E-01	0.61028636E 00	0.09999999E 01	0.
0.88156084E-05	0.64099879E-05	0.13752925E 01	0.60037261E 04	0.95782527E 00
0.60525167E-08	0.54718440E-09	0.11061201E 02	0.41971324E 08	0.97572728E 00

RSQ = 0.9526
R = 0.9760
F(2,165)= 1657.5032
SUMUSQ = 0.3135
DURBIN-W.= 0.1843

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y_i}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
1	1573.00	0.0328	0.0393	-0.0065
2	1964.00	0.0476	0.0511	-0.0036
3	2512.00	0.0651	0.0708	-0.0057
4	2691.00	0.0768	0.0780	-0.0012
5	2967.00	0.0991	0.0899	0.0092
6	3250.00	0.1166	0.1030	0.0135

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
7	3458.00	0.1316	0.1133	0.0182
8	3622.00	0.1448	0.1218	0.0230
9	3695.00	0.1496	0.1257	0.0239
10	3877.00	0.1638	0.1356	0.0282
11	4136.00	0.1826	0.1505	0.0321
12	4492.00	0.2026	0.1722	0.0304
13	4723.00	0.2196	0.1871	0.0325
14	4932.00	0.2343	0.2012	0.0331
15	5411.00	0.2548	0.2354	0.0194
16	5566.00	0.2643	0.2470	0.0173
17	5660.00	0.2753	0.2543	0.0211
18	5855.00	0.2868	0.2696	0.0173
19	5957.00	0.2933	0.2778	0.0156
20	6115.00	0.3061	0.2907	0.0154
21	6214.00	0.3166	0.2989	0.0176
22	6592.00	0.3766	0.3316	0.0450
23	7125.00	0.4313	0.3805	0.0508
24	7620.00	0.4833	0.4291	0.0542
25	7926.00	0.5213	0.4606	0.0608
26	8033.00	0.5321	0.4718	0.0602
27	8119.00	0.5456	0.4810	0.0646
28	8566.00	0.6056	0.5301	0.0755
29	8814.00	0.6253	0.5584	0.0670
30	9032.00	0.6433	0.5838	0.0595
31	9410.00	0.6678	0.6294	0.0385
32	9618.00	0.6826	0.6551	0.0274
33	9734.00	0.6931	0.6697	0.0233
34	9911.00	0.7171	0.6924	0.0247
35	10090.00	0.7381	0.7156	0.0225
36	10284.00	0.7581	0.7412	0.0168

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
37	10406.00	0.7723	0.7576	0.0147
38	10516.00	0.7866	0.7725	0.0141
39	657.00	0.0150	0.0189	-0.0039
40	1893.00	0.0460	0.0488	-0.0028
41	2393.00	0.0665	0.0662	0.0003
42	2697.00	0.0847	0.0783	0.0065
43	3030.00	0.1002	0.0927	0.0075
44	3330.00	0.1175	0.1069	0.0106
45	3571.00	0.1367	0.1191	0.0176
46	3946.00	0.1575	0.1395	0.0180
47	4412.00	0.1782	0.1672	0.0111
48	4719.00	0.1935	0.1868	0.0067
49	5301.00	0.2165	0.2273	-0.0108
50	5557.00	0.2317	0.2463	-0.0146
51	5670.00	0.2410	0.2550	-0.0140
52	5901.00	0.2575	0.2732	-0.0157
53	5983.00	0.2685	0.2799	-0.0114
54	6090.00	0.2810	0.2886	-0.0076
55	6182.00	0.2922	0.2963	-0.0040
56	6263.00	0.3067	0.3031	0.0037
57	6307.00	0.3160	0.3068	0.0092
58	6781.00	0.3607	0.3485	0.0122
59	7283.00	0.4045	0.3957	0.0088
60	7535.00	0.4282	0.4205	0.0077
61	7728.00	0.4445	0.4401	0.0044
62	7870.00	0.4605	0.4547	0.0058
63	8111.00	0.4785	0.4801	-0.0016
64	8290.00	0.4925	0.4995	-0.0070
65	8530.00	0.5112	0.5260	-0.0148
66	8719.00	0.5242	0.5474	-0.0232

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
67	9002.00	0.5427	0.5803	-0.0375
68	9502.00	0.5697	0.6407	-0.0709
69	624.00	0.0140	0.0183	-0.0043
70	2025.00	0.0367	0.0531	-0.0164
71	2646.00	0.0550	0.0762	-0.0212
72	2775.00	0.0652	0.0815	-0.0163
73	3048.00	0.0812	0.0936	-0.0123
74	3315.00	0.0992	0.1062	-0.0069
75	3586.00	0.1190	0.1199	-0.0009
76	3817.00	0.1382	0.1323	0.0060
77	4181.00	0.1610	0.1531	0.0079
78	4391.00	0.1762	0.1659	0.0104
79	4663.00	0.1947	0.1832	0.0116
80	4889.00	0.2132	0.1982	0.0150
81	5350.00	0.2367	0.2309	0.0059
82	5522.00	0.2507	0.2437	0.0071
83	5679.00	0.2587	0.2557	0.0030
84	5760.00	0.2632	0.2620	0.0012
85	6088.00	0.2822	0.2885	-0.0062
86	6256.00	0.2932	0.3025	-0.0092
87	6354.00	0.2997	0.3108	-0.0111
88	6619.00	0.3222	0.3340	-0.0117
89	6688.00	0.3262	0.3401	-0.0139
90	6762.00	0.3302	0.3468	-0.0166
91	6773.00	0.3422	0.3478	-0.0056
92	6785.00	0.3432	0.3489	-0.0057
93	7128.00	0.3865	0.3808	0.0057
94	7448.00	0.4460	0.4119	0.0341
95	7539.00	0.4587	0.4209	0.0378
96	7615.00	0.4682	0.4286	0.0397

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
97	7675.00	0.4805	0.4346	0.0459
98	7809.00	0.4962	0.4484	0.0479
99	7910.00	0.5112	0.4589	0.0524
100	7986.00	0.5220	0.4669	0.0552
101	8115.00	0.5388	0.4806	0.0583
102	8241.00	0.5528	0.4942	0.0587
103	8390.00	0.5726	0.5105	0.0622
104	8542.00	0.5906	0.5274	0.0633
105	8678.00	0.6066	0.5428	0.0639
106	8811.00	0.6216	0.5580	0.0636
107	8956.00	0.6374	0.5749	0.0625
108	9083.00	0.6519	0.5899	0.0620
109	9192.00	0.6686	0.6029	0.0658
110	9282.00	0.6846	0.6137	0.0709
111	9420.00	0.7068	0.6306	0.0763
112	9500.00	0.7173	0.6404	0.0769
113	550.00	0.0132	0.0171	−0.0039
114	1521.00	0.0327	0.0379	−0.0051
115	2108.00	0.0497	0.0559	−0.0062
116	2586.00	0.0697	0.0737	−0.0040
117	2874.00	0.0870	0.0858	0.0012
118	3092.00	0.0980	0.0956	0.0024
119	3412.00	0.1162	0.1110	0.0053
120	3852.00	0.1342	0.1342	0.0000
121	4493.00	0.1535	0.1722	−0.0187
122	4753.00	0.1677	0.1891	−0.0213
123	5278.00	0.1912	0.2256	−0.0343
124	5520.00	0.2080	0.2435	−0.0355
125	5683.00	0.2220	0.2560	−0.0340
126	5881.00	0.2320	0.2716	−0.0396

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
127	6133.00	0.2452	0.2922	-0.0469
128	6356.00	0.2577	0.3110	-0.0533
129	6594.00	0.2710	0.3318	-0.0608
130	6891.00	0.2870	0.3586	-0.0716
131	7414.00	0.3242	0.4085	-0.0843
132	7550.00	0.3332	0.4220	-0.0888
133	7702.00	0.3480	0.4374	-0.0894
134	7829.00	0.3580	0.4505	-0.0925
135	8080.00	0.3747	0.4768	-0.1021
136	8366.00	0.3917	0.5078	-0.1161
137	8712.00	0.4097	0.5466	-0.1369
138	9123.00	0.4297	0.5946	-0.1649
139	9442.00	0.4415	0.6333	-0.1918
140	720.00	0.0155	0.0199	-0.0044
141	1923.00	0.0370	0.0498	-0.0128
142	2360.00	0.0548	0.0650	-0.0102
143	2593.00	0.0656	0.0740	-0.0084
144	2742.00	0.0783	0.0801	-0.0018
145	2900.00	0.0873	0.0869	0.0004
146	3210.00	0.1053	0.1011	0.0042
147	3552.00	0.1273	0.1181	0.0092
148	3895.00	0.1501	0.1366	0.0135
149	4238.00	0.1691	0.1565	0.0126
150	4455.00	0.1781	0.1699	0.0082
151	4761.00	0.1973	0.1896	0.0077
152	5306.00	0.2208	0.2276	-0.0068
153	5551.00	0.2360	0.2459	-0.0098
154	5783.00	0.2520	0.2639	-0.0118
155	6087.00	0.2710	0.2884	-0.0173
156	6268.00	0.3005	0.3035	-0.0030

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
157	6466.00	0.3178	0.3205	-0.0027
158	6620.00	0.3290	0.3341	-0.0051
159	6688.00	0.3352	0.3401	-0.0049
160	6820.00	0.3437	0.3521	-0.0084
161	6876.00	0.3492	0.3572	-0.0080
162	7620.00	0.4062	0.4291	-0.0229
163	8469.00	0.4774	0.5192	-0.0418
164	8657.00	0.4887	0.5404	-0.0517
165	8736.00	0.4932	0.5494	-0.0562
166	9034.00	0.5157	0.5841	-0.0684
167	9366.00	0.5379	0.6240	-0.0860
168	9500.00	0.5469	0.6404	-0.0935

Table 42

ESTIMATED DRILLING TIME FUNCTION FOR GOMEZ FIELD (TEXAS)

FOR 17-1/2-INCH DIAMETER WELLS

$$Y_{DT} = 0.107(10^{-2})X^2 + 0.056X - 13$$

where: Y_{DT} = Drilling time in hours

X = Depth in feet

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
-0.12881994E-01	0.36052929E-01	-0.35730784E-00	0.09999999E 01	0.
0.56300545E-04	0.30874474E-04	0.18235304E 01	0.28082075E 04	0.84177455E 00
0.10735277E-07	0.61143507E-08	0.17557510E 01	0.89652321E 07	0.84137858E 00

RSQ =	0.7171
R =	0.8468
F(2,103)=	130.5121
SUMUSQ =	0.5445
DURBIN-W.=	0.1609

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
1	664.00	0.0310	0.0292	0.0018
2	838.00	0.0390	0.0418	-0.0028
3	1284.00	0.0630	0.0771	-0.0141
4	1784.00	0.0880	0.1217	-0.0337
5	2101.00	0.1190	0.1528	-0.0338
6	2464.00	0.1587	0.1910	-0.0323

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
7	2678.00	0.1930	0.2149	-0.0219
8	2795.00	0.2102	0.2283	-0.0181
9	3010.00	0.2337	0.2538	-0.0201
10	3137.00	0.2497	0.2694	-0.0196
11	3325.00	0.2702	0.2930	-0.0228
12	3409.00	0.2882	0.3038	-0.0156
13	3488.00	0.3085	0.3141	-0.0056
14	3607.00	0.3315	0.3299	0.0016
15	3697.00	0.3485	0.3420	0.0065
16	103.00	0.0050	-0.0070	0.0120
17	702.00	0.0230	0.0319	-0.0089
18	1678.00	0.0537	0.1118	-0.0581
19	2192.00	0.0730	0.1621	-0.0891
20	2488.00	0.0910	0.1936	-0.1026
21	2703.00	0.1040	0.2177	-0.1137
22	2925.00	0.1075	0.2436	-0.1361
23	3073.00	0.1262	0.2615	-0.1353
24	3243.00	0.1432	0.2826	-0.1394
25	3365.00	0.1582	0.2981	-0.1399
26	3574.00	0.1797	0.3255	-0.1457
27	3768.00	0.1967	0.3517	-0.1549
28	3956.00	0.2125	0.3778	-0.1653
29	4171.00	0.2277	0.4087	-0.1810
30	4420.00	0.2390	0.4457	-0.2067
31	643.00	0.0420	0.0278	0.0142
32	1288.00	0.0755	0.0774	-0.0019
33	1752.00	0.1050	0.1187	-0.0137
34	2075.00	0.1352	0.1502	-0.0149
35	2525.00	0.1690	0.1977	-0.0287
36	2699.00	0.2137	0.2173	-0.0035

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
37	2860.00	0.2447	0.2359	0.0088
38	3045.00	0.2740	0.2581	0.0159
39	3229.00	0.2942	0.2808	0.0134
40	3368.00	0.3150	0.2985	0.0165
41	3521.00	0.3530	0.3184	0.0346
42	3657.00	0.3962	0.3366	0.0597
43	4011.00	0.4372	0.3856	0.0516
44	4240.00	0.4530	0.4188	0.0342
45	650.00	0.0344	0.0282	0.0062
46	1618.00	0.0719	0.1063	-0.0344
47	2390.00	0.1174	0.1830	-0.0656
48	3014.00	0.1716	0.2543	-0.0827
49	3178.00	0.1954	0.2745	-0.0791
50	3341.00	0.2154	0.2950	-0.0796
51	3622.00	0.2576	0.3319	-0.0742
52	3887.00	0.2784	0.3682	-0.0898
53	4239.00	0.3171	0.4187	-0.1015
54	843.00	0.0395	0.0422	-0.0027
55	1193.00	0.0615	0.0696	-0.0081
56	1312.00	0.0870	0.0795	0.0075
57	1556.00	0.1210	0.1007	0.0203
58	1936.00	0.1460	0.1364	0.0096
59	2248.00	0.1770	0.1679	0.0091
60	2444.00	0.2092	0.1888	0.0204
61	2573.00	0.2670	0.2031	0.0639
62	2890.00	0.3357	0.2395	0.0963
63	2974.00	0.3482	0.2495	0.0987
64	3071.00	0.3597	0.2613	0.0985
65	3126.00	0.3677	0.2680	0.0997
66	3226.00	0.3807	0.2805	0.1003

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
67	3311.00	0.3932	0.2912	0.1020
68	3383.00	0.4055	0.3004	0.1051
69	3706.00	0.4352	0.3432	0.0920
70	3858.00	0.4457	0.3641	0.0816
71	4075.00	0.4662	0.3948	0.0714
72	4203.00	0.4787	0.4134	0.0654
73	825.00	0.0730	0.0409	0.0321
74	1188.00	0.1055	0.0692	0.0363
75	1702.00	0.1527	0.1140	0.0387
76	2100.00	0.1837	0.1527	0.0311
77	2500.00	0.2200	0.1950	0.0250
78	2781.00	0.2807	0.2267	0.0540
79	2993.00	0.3135	0.2518	0.0617
80	3083.00	0.3335	0.2627	0.0708
81	3223.00	0.3527	0.2801	0.0727
82	3251.00	0.3567	0.2836	0.0731
83	3281.00	0.3645	0.2874	0.0771
84	3346.00	0.3767	0.2957	0.0811
85	3354.00	0.3812	0.2967	0.0845
86	3491.00	0.4060	0.3145	0.0915
87	3848.00	0.4632	0.3627	0.1005
88	3929.00	0.4712	0.3740	0.0972
89	3960.00	0.4762	0.3784	0.0978
90	4051.00	0.4897	0.3914	0.0984
91	4161.00	0.5052	0.4073	0.0980
92	4228.00	0.5195	0.4171	0.1024
93	640.00	0.0430	0.0275	0.0155
94	1143.00	0.0785	0.0655	0.0130
95	1597.00	0.1115	0.1044	0.0071
96	2160.00	0.1440	0.1588	-0.0148

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
97	2396.00	0.1720	0.1836	-0.0116
98	2530.00	0.1985	0.1983	0.0002
99	2918.00	0.2360	0.2428	-0.0068
100	3056.00	0.2495	0.2594	-0.0099
101	3186.00	0.2682	0.2755	-0.0072
102	3410.00	0.2885	0.3039	-0.0154
103	3581.00	0.3115	0.3264	-0.0149
104	3788.00	0.3350	0.3544	-0.0194
105	4102.00	0.3690	0.3987	-0.0297
106	4446.00	0.3982	0.4496	-0.0514

Table 43

ESTIMATED DRILLING TIME FUNCTION FOR AGGREGATED LOCKRIDGE AND S. PYOTE (TEXAS) FOR 12-1/4-INCH DIAMETER WELLS

$$Y_{DT} = 42 + 0.02X + 0.40(10^{-3})X^2$$

where: Y_{DT} = Drilling time in hours

X = Depth in feet

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.41661263E-01	0.34418273E-01	0.12104402E 01	0.09999999E 01	0.
0.22388936E-04	0.12385736E-04	0.18076387E 01	0.65690298E 04	0.95736743E 00
0.40312144E-08	0.98353661E-09	0.40986928E 01	0.50860722E 08	0.96463867E 00

RSQ =	0.9339
R =	0.9664
F(2, 64)=	452.1280
SUMUSQ =	0.1940
DURBIN-W.=	0.2216

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
1	1444.00	0.0647	0.0824	-0.0176
2	2202.00	0.1192	0.1105	0.0087
3	2593.00	0.1462	0.1268	0.0194
4	3548.00	0.1969	0.1718	0.0251
5	4328.00	0.2379	0.2141	0.0239
6	4733.00	0.2572	0.2379	0.0193

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
7	5082.00	0.2782	0.2596	0.0187
8	5453.00	0.2975	0.2836	0.0139
9	5771.00	0.3178	0.3051	0.0127
10	5822.00	0.3228	0.3087	0.0142
11	6655.00	0.4278	0.3692	0.0587
12	7555.00	0.5211	0.4409	0.0802
13	8290.00	0.6154	0.5043	0.1111
14	9531.00	0.7384	0.6212	0.1172
15	9543.00	0.7479	0.6224	0.1255
16	9675.00	0.7632	0.6356	0.1276
17	10002.00	0.7962	0.6689	0.1274
18	10130.00	0.8197	0.6821	0.1376
19	10198.00	0.8294	0.6892	0.1402
20	1500.00	0.0673	0.0843	-0.0171
21	2500.00	0.1344	0.1228	0.0115
22	3900.00	0.2096	0.1903	0.0193
23	4449.00	0.2353	0.2211	0.0143
24	4934.00	0.2513	0.2503	0.0011
25	5481.00	0.2708	0.2855	-0.0146
26	6123.00	0.2971	0.3299	-0.0327
27	7074.00	0.3726	0.4018	-0.0291
28	7739.00	0.4166	0.4564	-0.0397
29	8348.00	0.4509	0.5095	-0.0586
30	9180.00	0.5049	0.5869	-0.0820
31	9434.00	0.5236	0.6117	-0.0880
32	9745.00	0.5559	0.6427	-0.0867
33	9934.00	0.5716	0.6619	-0.0903
34	10120.00	0.5856	0.6811	-0.0955
35	1500.00	0.0673	0.0843	-0.0171
36	2500.00	0.1344	0.1228	0.0115

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
37	3900.00	0.2096	0.1903	0.0193
38	4640.00	0.2389	0.2323	0.0066
39	5249.00	0.2642	0.2702	-0.0060
40	5652.00	0.2819	0.2970	-0.0150
41	6304.00	0.3346	0.3430	-0.0084
42	6968.00	0.3979	0.3934	0.0045
43	7471.00	0.4294	0.4339	-0.0045
44	8091.00	0.4649	0.4867	-0.0218
45	8524.00	0.4952	0.5254	-0.0302
46	9332.00	0.5589	0.6017	-0.0427
47	9729.00	0.5924	0.6411	-0.0486
48	9963.00	0.6087	0.6649	-0.0561
49	10129.00	0.6202	0.6820	-0.0618
50	1371.00	0.0615	0.0799	-0.0185
51	1719.00	0.0818	0.0921	-0.0103
52	2669.00	0.1285	0.1301	-0.0017
53	3711.00	0.1810	0.1803	0.0007
54	4420.00	0.2200	0.2194	0.0006
55	4882.00	0.2365	0.2470	-0.0106
56	5440.00	0.2620	0.2828	-0.0208
57	5860.00	0.2813	0.3113	-0.0300
58	6085.00	0.2996	0.3272	-0.0276
59	6932.00	0.3746	0.3906	-0.0160
60	7459.00	0.4141	0.4329	-0.0189
61	8290.00	0.4801	0.5043	-0.0242
62	8916.00	0.5328	0.5617	-0.0290
63	9566.00	0.5968	0.6247	-0.0279
64	9717.00	0.6178	0.6398	-0.0221
65	9870.00	0.6395	0.6553	-0.0158
66	10040.00	0.6568	0.6728	-0.0160
67	10210.00	0.6725	0.6905	-0.0180

Table 44

ESTIMATED DRILLING TIME FUNCTION FOR AGGREGATED LOCKRIDGE AND S. PYOTE (TEXAS) FOR 13-3/4-INCH DIAMETER WELLS

$$Y_{DT} = 62 + 0.24(10^{-2})X + 0.81(10^{-5})X^2$$

where: Y_{DT} = Drilling time in hours

X = Depth in feet

COEFFICIENT	STANDARD ERROR	T-VALUE	VARIABLE MEAN	SIMPLE R(Y,X)
0.61847210E-01	0.37793708E-01	0.16364419E 01	0.09999999E 01	0.
0.23826724E-05	0.12467415E-04	0.19111197E-00	0.72590074E 04	0.94038161E 00
0.81051183E-08	0.94436096E-09	0.85826486E 01	0.60261369E 08	0.96225456E 00

RSQ =	0.9260
R =	0.9623
F(2,131)=	819.0731
SUMUSQ =	0.9694
DURBIN-W.=	0.0952

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
1	140.00	0.0046	0.0623	-0.0578
2	1233.00	0.0436	0.0771	-0.0335
3	1909.00	0.0788	0.0959	-0.0172
4	2358.00	0.1178	0.1125	0.0052
5	2913.00	0.1560	0.1376	0.0184
6	3381.00	0.1990	0.1626	0.0364

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
7	3842.00	0.2325	0.1906	0.0418
8	4494.00	0.2983	0.2362	0.0620
9	4835.00	0.3398	0.2628	0.0769
10	5145.00	0.3806	0.2887	0.0919
11	5420.00	0.4076	0.3129	0.0947
12	5586.00	0.4176	0.3281	0.0895
13	5818.00	0.4404	0.3501	0.0903
14	6039.00	0.4634	0.3718	0.0915
15	6205.00	0.4824	0.3887	0.0937
16	6465.00	0.5006	0.4160	0.0846
17	6533.00	0.5121	0.4233	0.0887
18	6683.00	0.5266	0.4398	0.0868
19	6843.00	0.5458	0.4577	0.0881
20	7069.00	0.5690	0.4837	0.0853
21	7192.00	0.5838	0.4982	0.0856
22	7225.00	0.5890	0.5022	0.0868
23	7365.00	0.6075	0.5190	0.0884
24	7508.00	0.6313	0.5366	0.0946
25	7644.00	0.6515	0.5536	0.0978
26	7779.00	0.6690	0.5708	0.0981
27	7894.00	0.6828	0.5857	0.0970
28	7985.00	0.6913	0.5977	0.0936
29	8518.00	0.7523	0.6702	0.0820
30	8818.00	0.7858	0.7131	0.0727
31	9132.00	0.8286	0.7595	0.0691
32	9210.00	0.8384	0.7713	0.0671
33	9333.00	0.8616	0.7901	0.0715
34	9478.00	0.8881	0.8125	0.0755
35	9575.00	0.9093	0.8277	0.0815
36	9703.00	0.9333	0.8480	0.0852

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
37	9792.00	0.9541	0.8623	0.0917
38	9836.00	0.9648	0.8694	0.0954
39	1300.00	0.0425	0.0786	-0.0362
40	2390.00	0.1093	0.1138	-0.0045
41	2769.00	0.1490	0.1306	0.0184
42	3496.00	0.2007	0.1692	0.0315
43	4126.00	0.2442	0.2097	0.0346
44	4726.00	0.2779	0.2541	0.0238
45	5140.00	0.3086	0.2882	0.0204
46	5481.00	0.3233	0.3184	0.0049
47	5841.00	0.3386	0.3523	-0.0137
48	6241.00	0.3553	0.3924	-0.0371
49	6551.00	0.3690	0.4253	-0.0563
50	6771.00	0.3813	0.4496	-0.0682
51	6940.00	0.3938	0.4688	-0.0749
52	7096.00	0.4055	0.4869	-0.0813
53	7167.00	0.4112	0.4953	-0.0840
54	7518.00	0.4607	0.5379	-0.0771
55	7602.00	0.4742	0.5484	-0.0741
56	7693.00	0.4869	0.5599	-0.0729
57	7900.00	0.5274	0.5865	-0.0591
58	7971.00	0.5387	0.5958	-0.0571
59	8234.00	0.5757	0.6310	-0.0553
60	8435.00	0.6052	0.6586	-0.0534
61	8690.00	0.6472	0.6946	-0.0474
62	8831.00	0.6735	0.7150	-0.0414
63	8912.00	0.6748	0.7268	-0.0520
64	9162.00	0.7248	0.7640	-0.0393
65	9202.00	0.7341	0.7701	-0.0360
66	9380.00	0.7766	0.7973	-0.0207

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
67	9433.00	0.7856	0.8055	-0.0199
68	9481.00	0.7929	0.8130	-0.0201
69	9665.00	0.8252	0.8420	-0.0168
70	9924.00	0.8782	0.8837	-0.0056
71	10209.00	0.9435	0.9309	0.0126
72	10412.00	0.9858	0.9653	0.0205
73	10667.00	1.0548	1.0095	0.0453
74	10735.00	1.0968	1.0215	0.0753
75	10801.00	1.1161	1.0331	0.0829
76	10850.00	1.1374	1.0419	0.0955
77	10894.00	1.1597	1.0497	0.1100
78	10998.00	1.1780	1.0684	0.1096
79	11040.00	1.1847	1.0760	0.1087
80	11100.00	1.1962	1.0869	0.1093
81	1327.00	0.0382	0.0793	-0.0410
82	2300.00	0.0950	0.1102	-0.0152
83	2977.00	0.1355	0.1408	-0.0053
84	3530.00	0.1832	0.1713	0.0119
85	4066.00	0.2282	0.2055	0.0227
86	4804.00	0.2852	0.2603	0.0249
87	5331.00	0.3149	0.3049	0.0100
88	5650.00	0.3302	0.3340	-0.0038
89	5963.00	0.3525	0.3643	-0.0118
90	6472.00	0.3758	0.4168	-0.0410
91	6801.00	0.3955	0.4529	-0.0574
92	7014.00	0.4132	0.4773	-0.0641
93	7374.00	0.4522	0.5201	-0.0679
94	7791.00	0.5089	0.5724	-0.0635
95	8116.00	0.5449	0.6151	-0.0702
96	8443.00	0.5979	0.6597	-0.0618

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
97	8790.00	0.6561	0.7090	-0.0529
98	9146.00	0.7106	0.7616	-0.0510
99	9395.00	0.7651	0.7996	-0.0345
100	9520.00	0.7906	0.8191	-0.0285
101	9602.00	0.8121	0.8320	-0.0199
102	9682.00	0.8308	0.8447	-0.0139
103	9799.00	0.8765	0.8635	0.0130
104	9911.00	0.9010	0.8816	0.0194
105	10024.00	0.9307	0.9001	0.0306
106	10150.00	0.9562	0.9210	0.0352
107	10166.00	0.9602	0.9237	0.0365
108	10411.00	1.0512	0.9652	0.0860
109	10638.00	1.1149	1.0044	0.1105
110	10732.00	1.1379	1.0209	0.1170
111	10836.00	1.1632	1.0394	0.1238
112	10952.00	1.1912	1.0601	0.1311
113	1320.00	0.0453	0.0791	-0.0338
114	2139.00	0.0876	0.1040	-0.0164
115	2415.00	0.1069	0.1149	-0.0080
116	2447.00	0.1089	0.1162	-0.0073
117	2963.00	0.1522	0.1401	0.0121
118	3872.00	0.2089	0.1926	0.0163
119	4715.00	0.2566	0.2533	0.0033
120	5337.00	0.2916	0.3054	-0.0138
121	5928.00	0.3166	0.3608	-0.0442
122	6280.00	0.3293	0.3965	-0.0672
123	6652.00	0.3436	0.4363	-0.0927
124	6916.00	0.3631	0.4660	-0.1029
125	7438.00	0.4118	0.5280	-0.1162
126	8132.00	0.4748	0.6172	-0.1424

SAMPLE NUMBER	OBSERVED VALUES		ESTIMATED VALUES	RESIDUAL
	X_1	$\frac{Y}{1000}$	$\frac{\hat{Y}}{1000}$	$\frac{Y - \hat{Y}}{1000}$
127	8542.00	0.5065	0.6736	-0.1671
128	8982.00	0.5435	0.7371	-0.1936
129	9495.00	0.5885	0.8152	-0.2267
130	9783.00	0.6395	0.8609	-0.2214
131	10299.00	0.7200	0.9461	-0.2261
132	10732.00	0.7760	1.0209	-0.2449
133	10930.00	0.7960	1.0562	-0.2602
134	11005.00	0.8043	1.0697	-0.2654